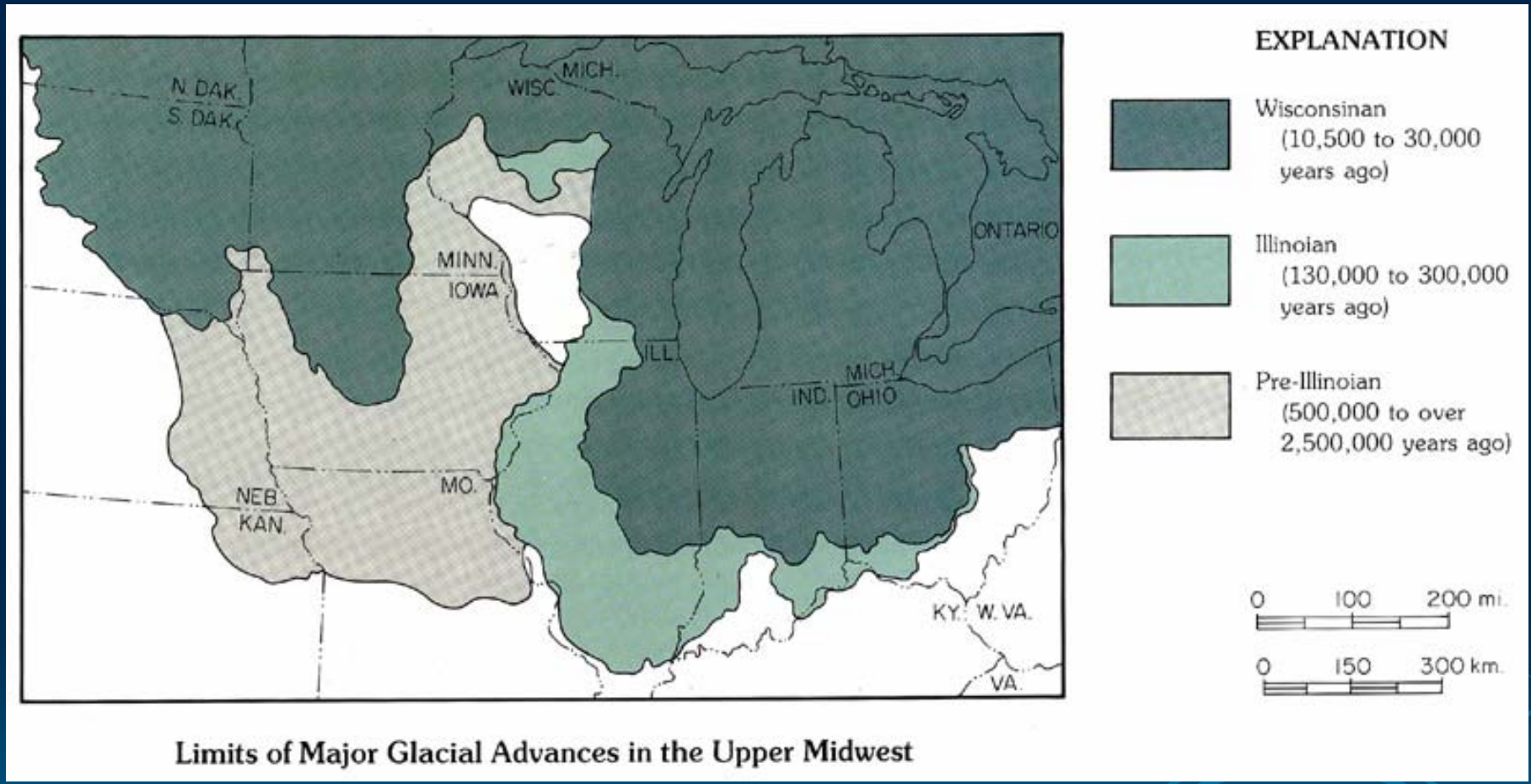
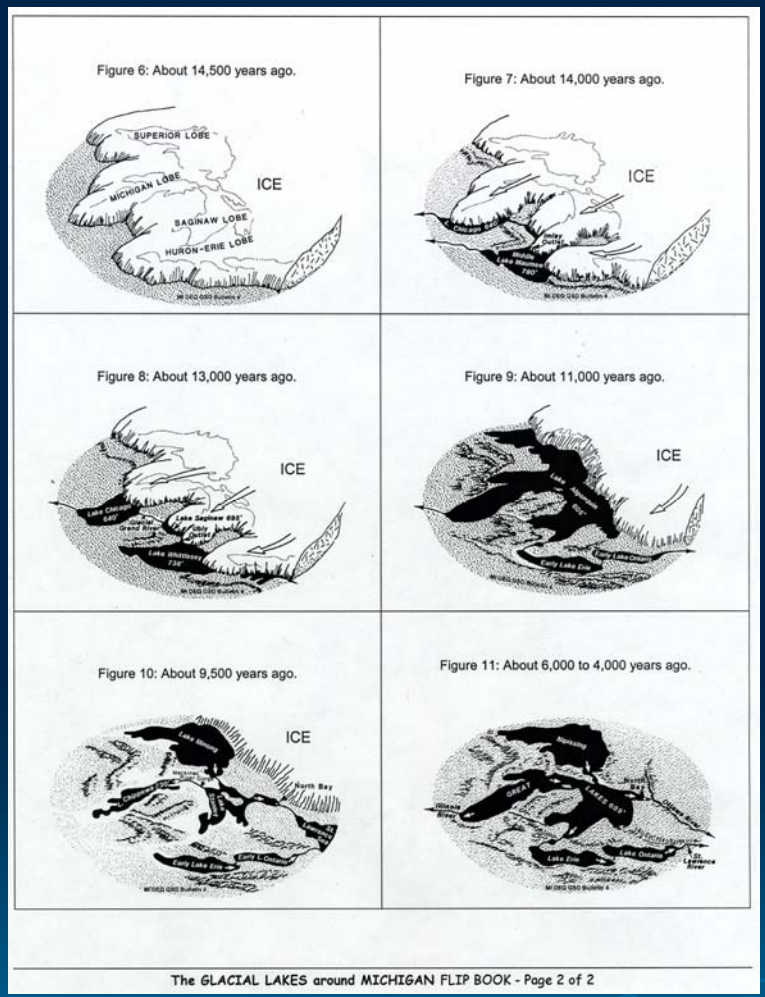
Review of Historical Processes

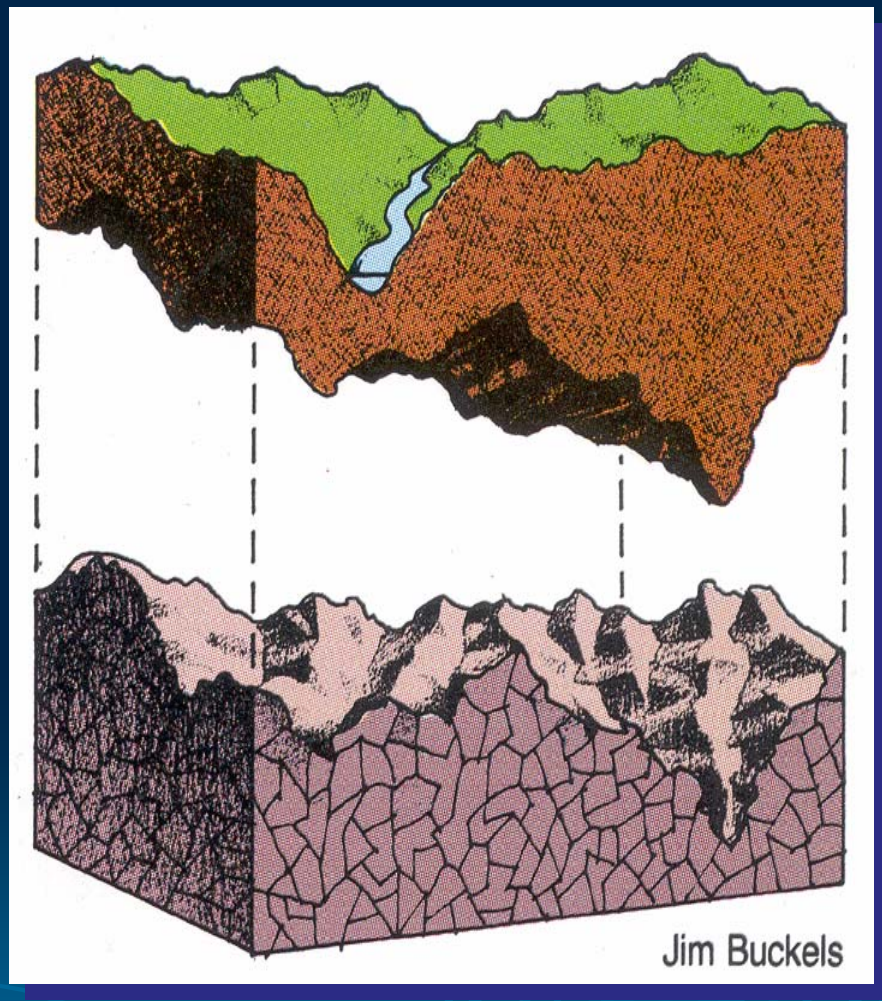


Limits of Major Glacial Advances in the Upper Midwest

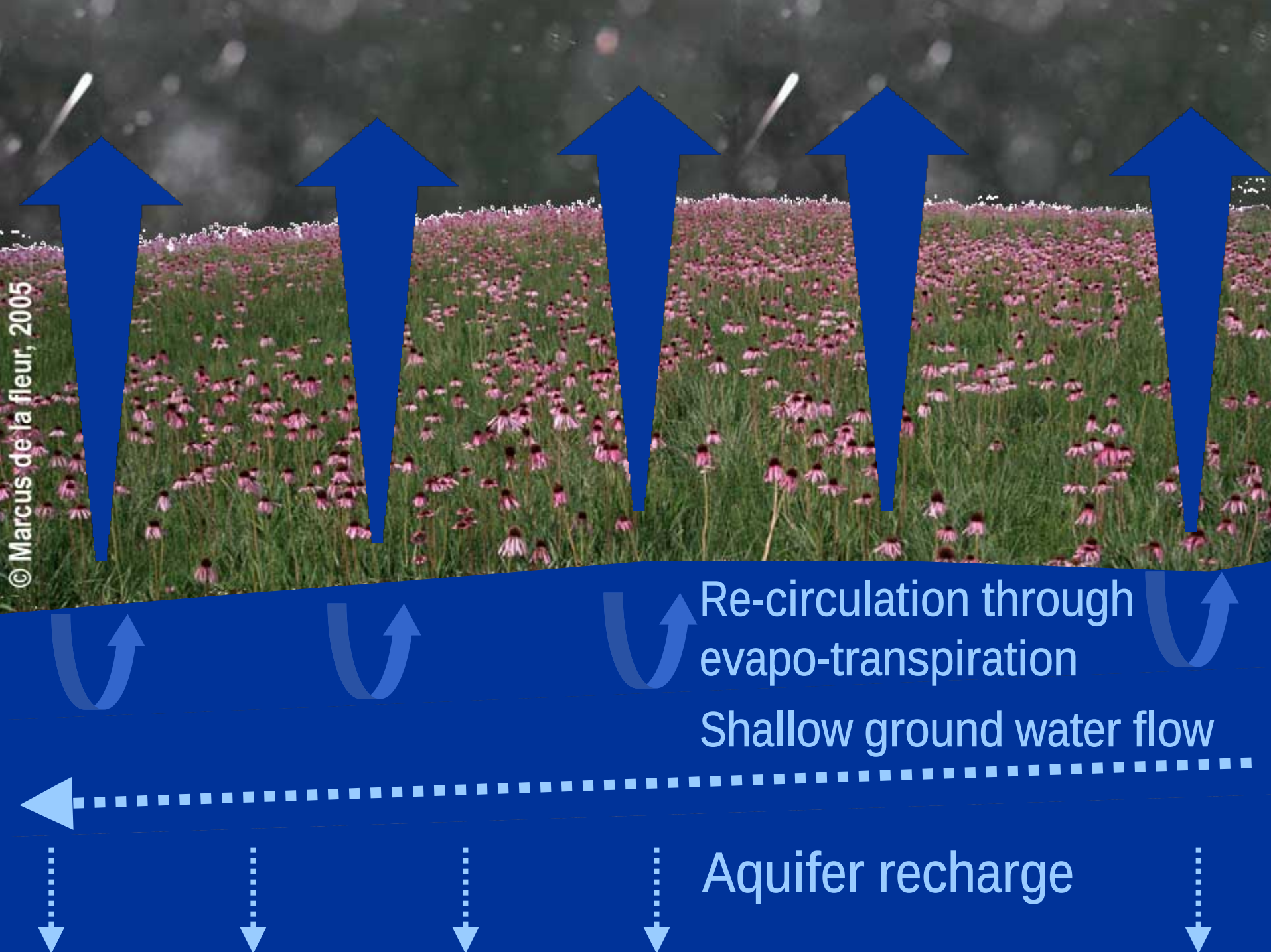
Glacial Advances in the Upper Midwest

The Glacial and Landform History of the Midwest





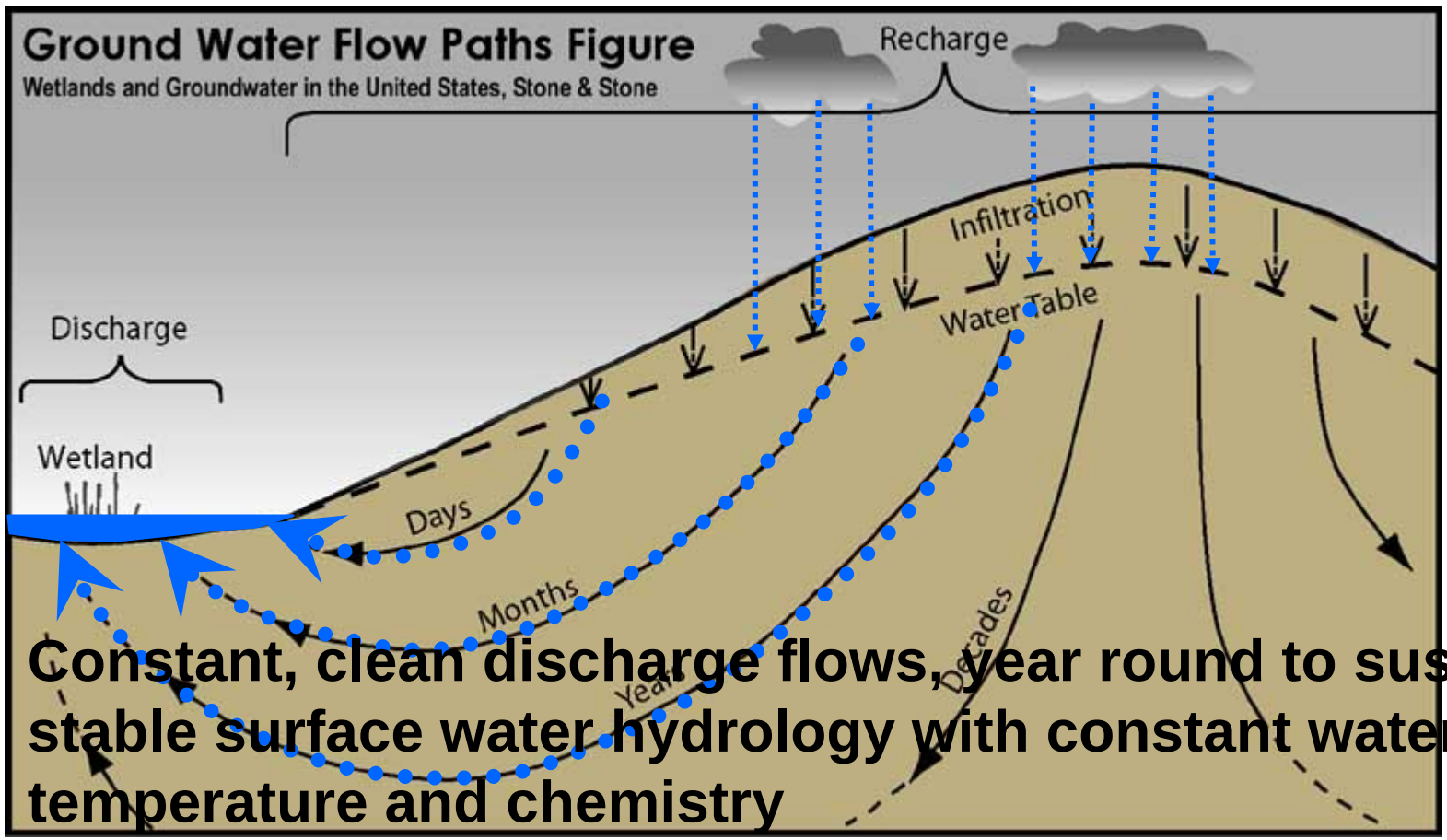
© Marcus de la fleur, 2005


© Marcus de la fleur, 2005
Re-circulation through evapo-transpiration
Shallow ground water flow
Aquifer recharge

Historical Patterns of Hydrology

Recharge Zone: Uplands

Discharge Zones: Lowlands- rivers, streams, ponds, wetlands

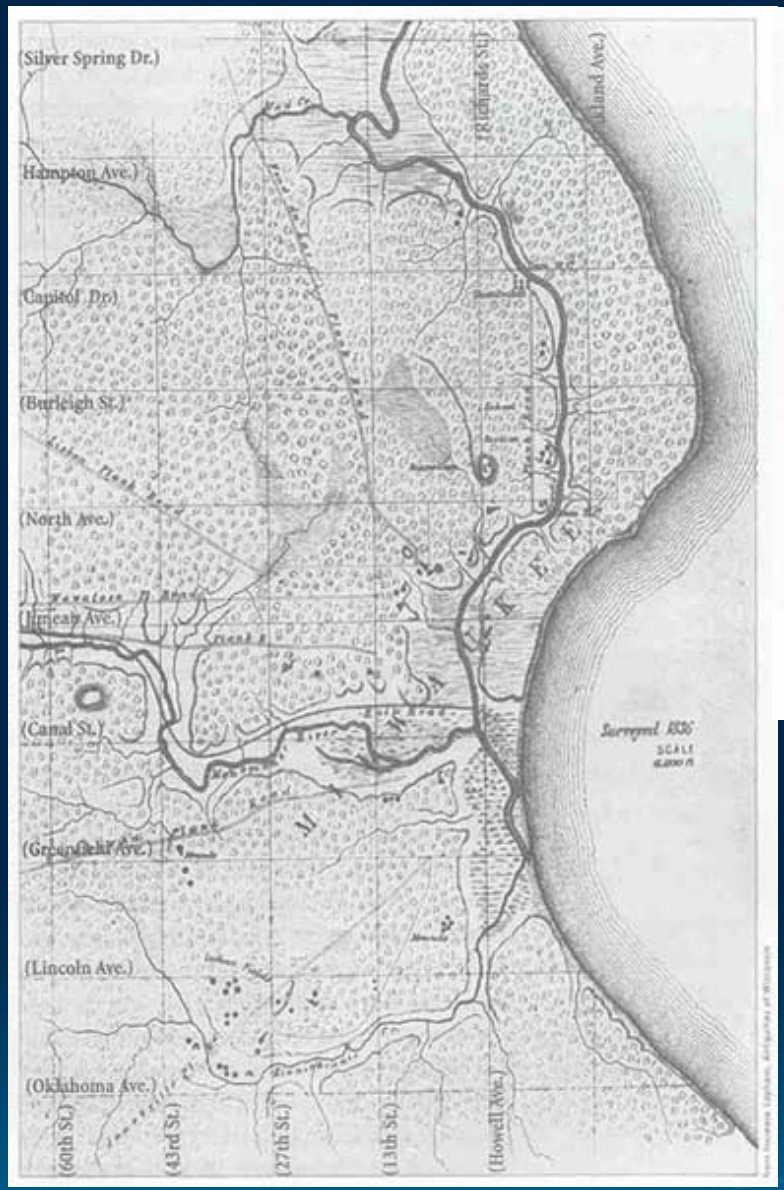


Constant, clean discharge flows, year round to sustain stable surface water hydrology with constant water temperature and chemistry

Bluff Spring Fens
Elgin, Illinois


© Marcus de la fleur, 2003


© Marcus de la fleur, 2003



State Historical Society of Wisconsin

Algonkian Speaking People

Eastern Ojibwa, Chippewa, & Ottawa

Fire: shkode

Prairie: mshkode

Western Algonkian Tribes

Fire: ashcota or shcota

Prairie: mushcota or mus-quo-ta

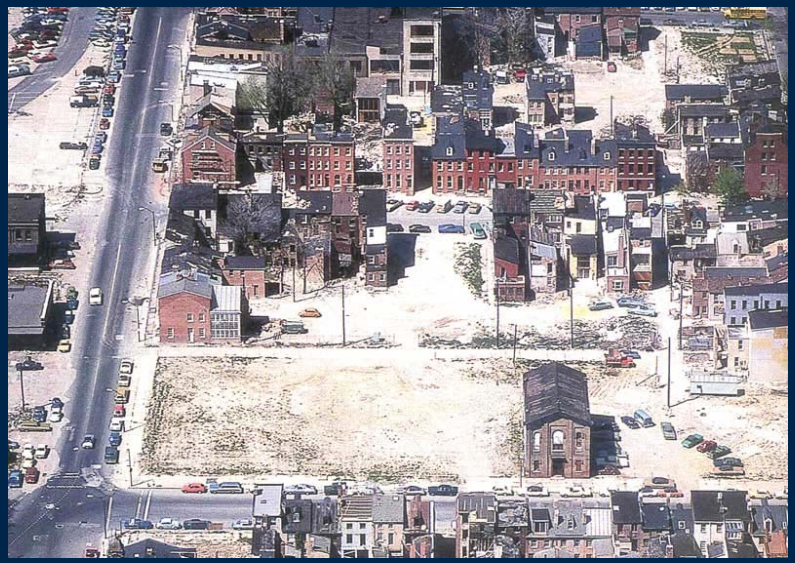
- Mascoutens: “The People of the Fire”

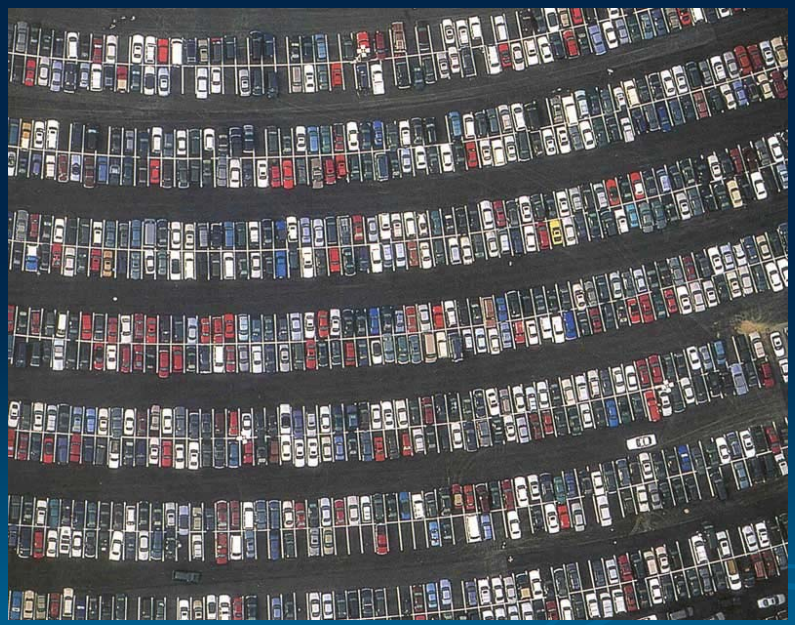
How did it work before?

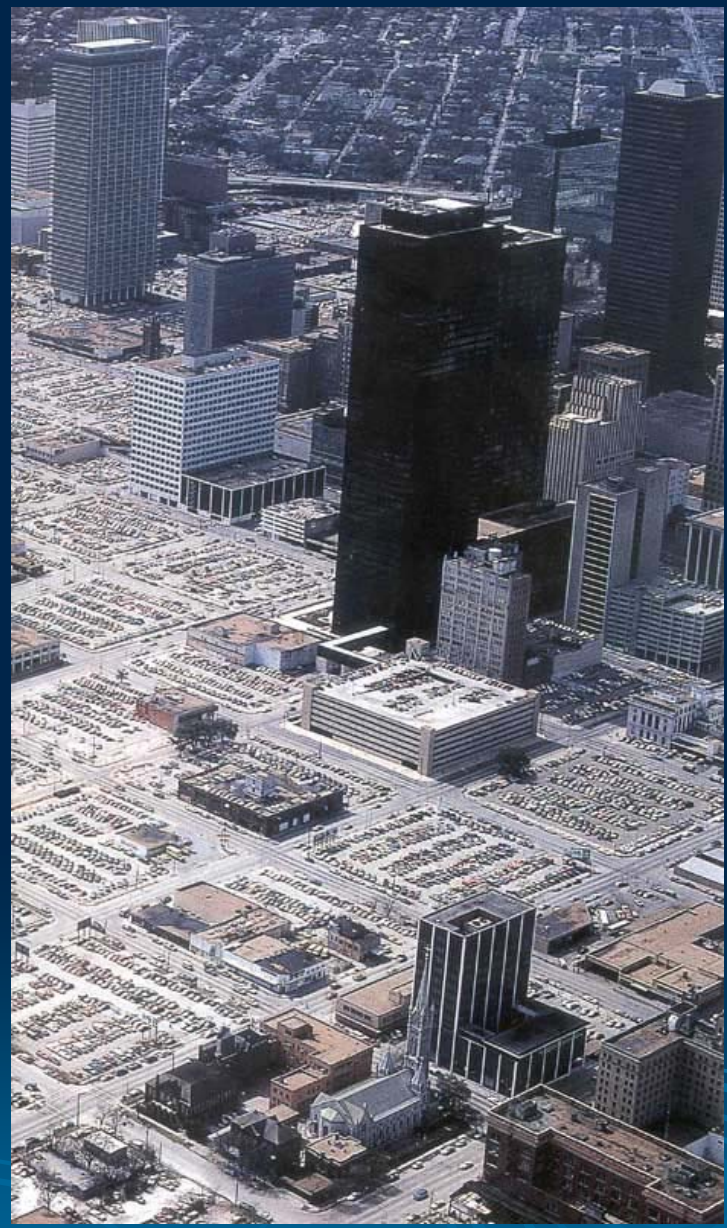
Historical natural and cultural functions/ processes

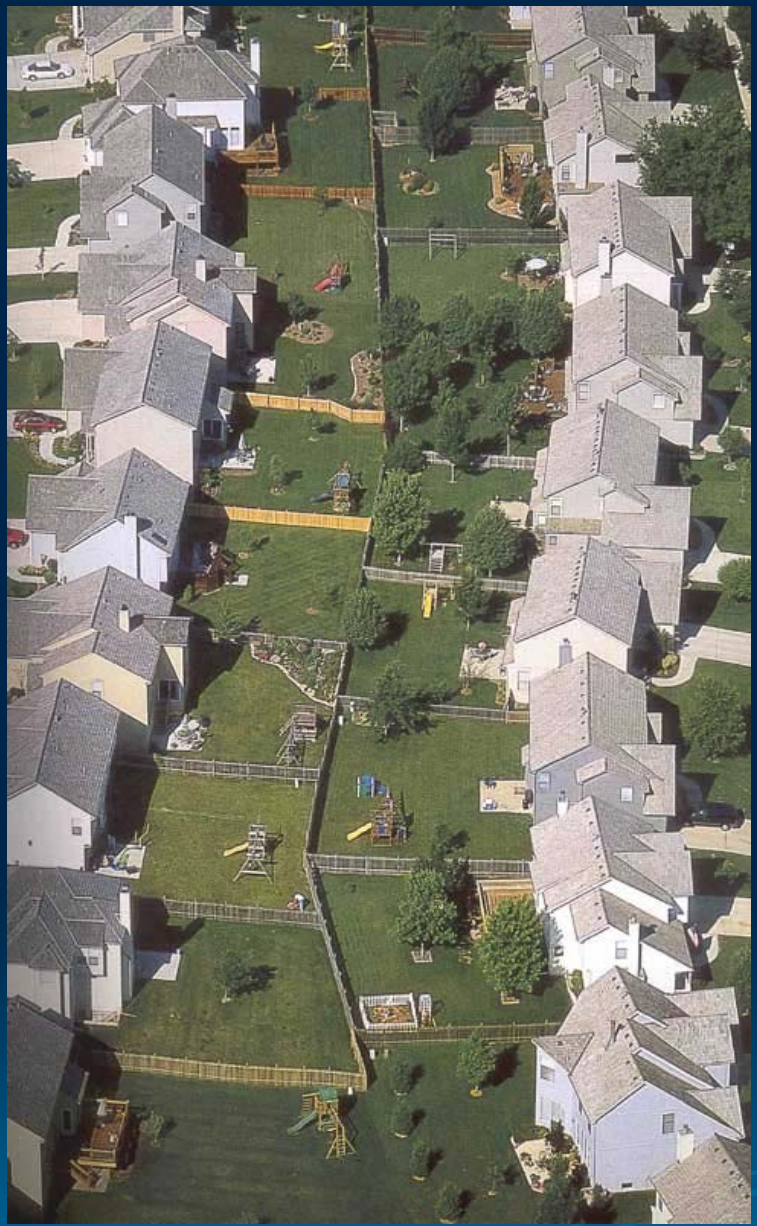
Why are we so screwed up?

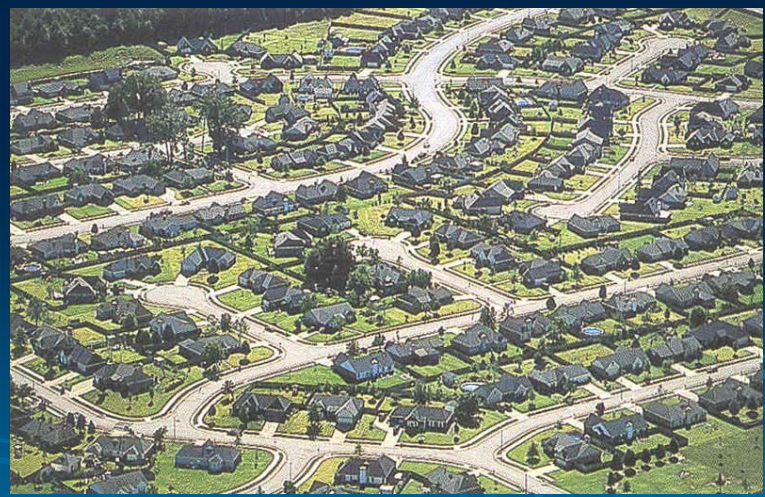
Contemporary urban, suburban, and rural land use and development standards





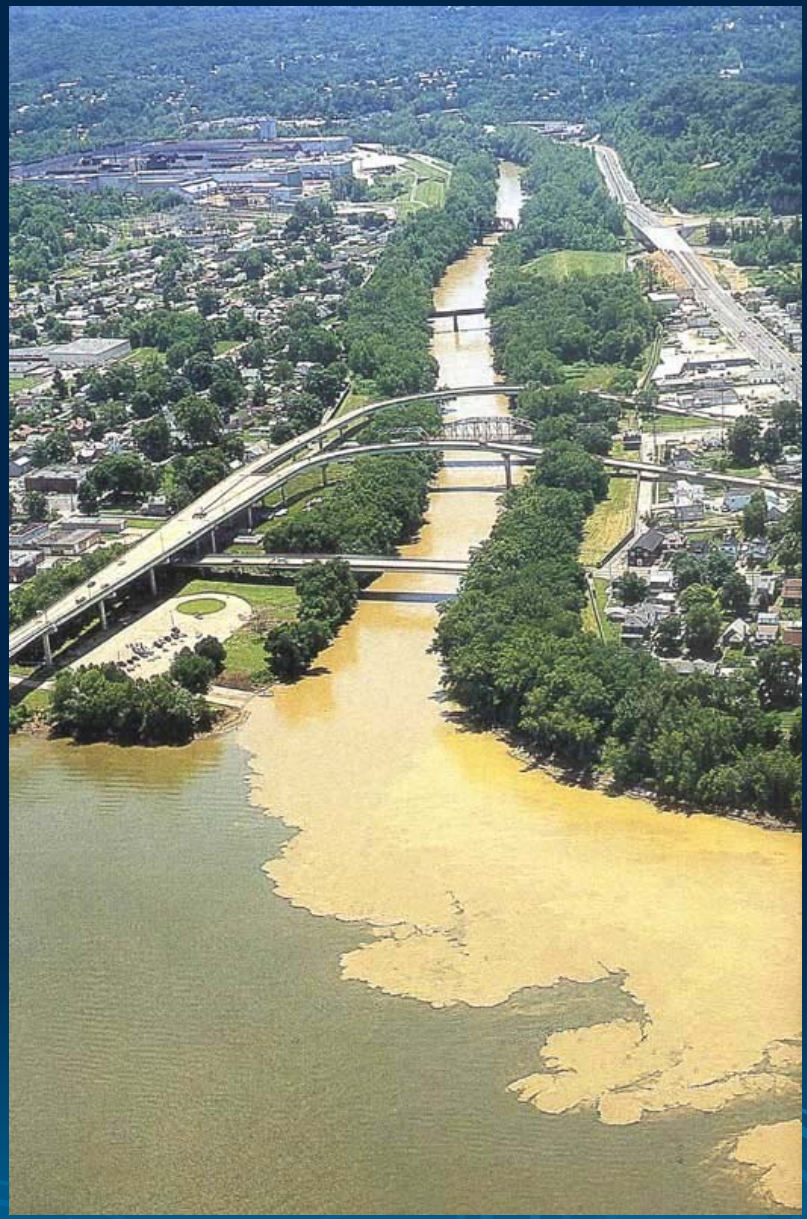






The Physics of Design

**“FOR EVERY DESIGN “ACTION”,
THERE ARE ENVIRONMENTAL, SOCIAL, AND
PSYCHOLOGICAL “REACTIONS” TO BE OBSERVED.”
(NEWTON’S THIRD LAW OF PHYSICS
APPLIED TO DESIGN.)**

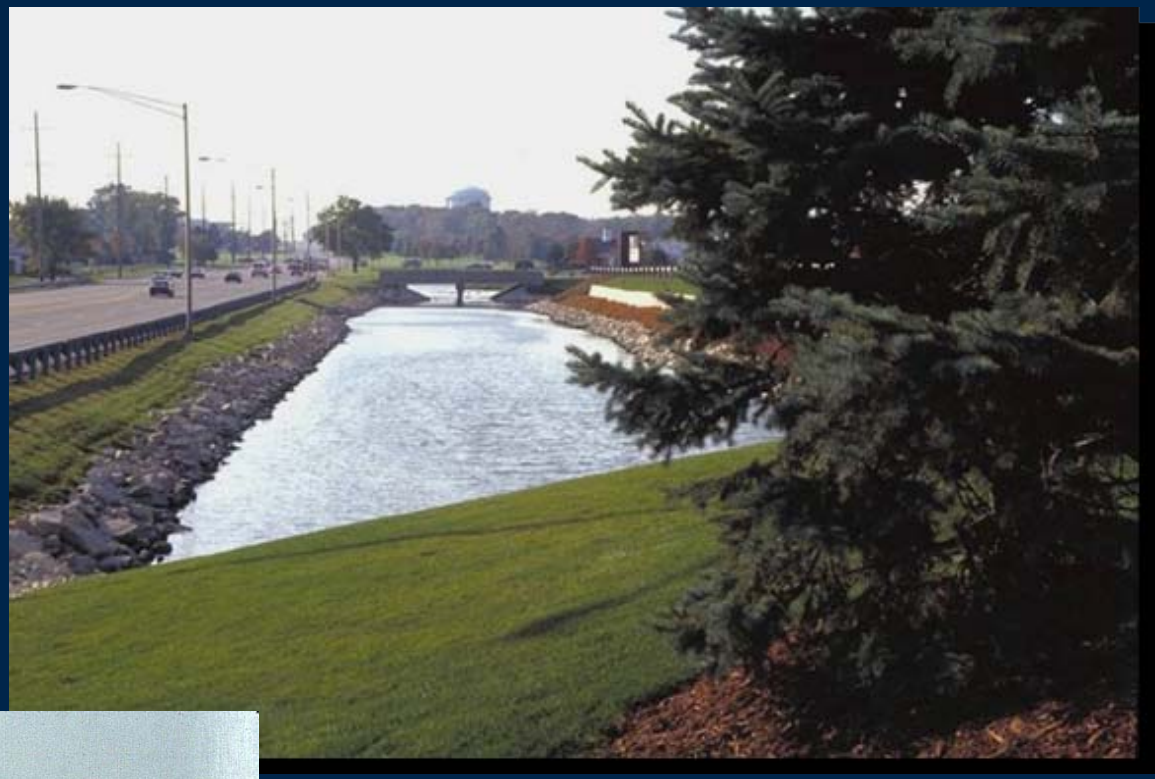


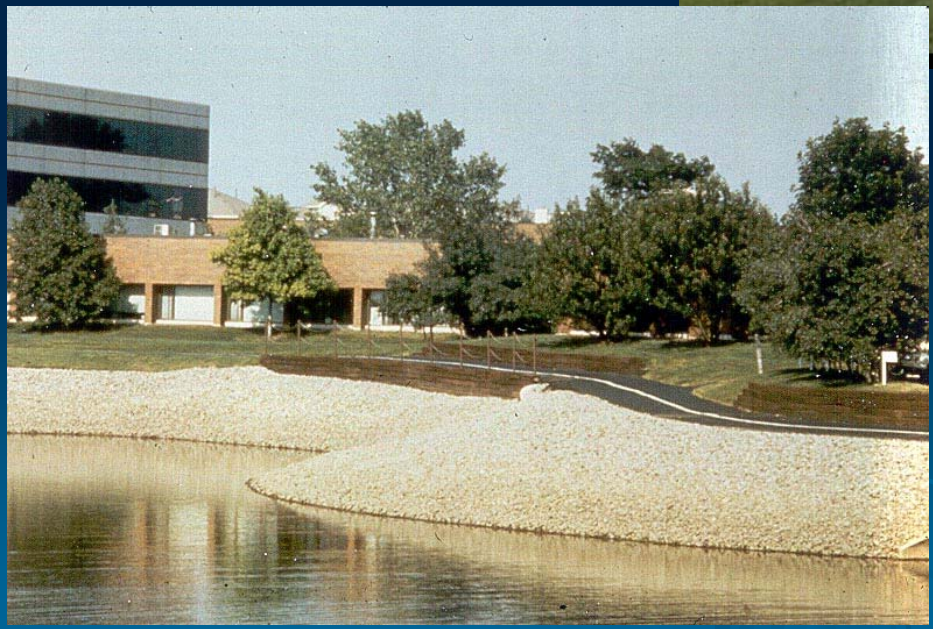
Water in Contemporary Urban, Suburban & Rural Environments

Traditional Stormwater Management Approach:

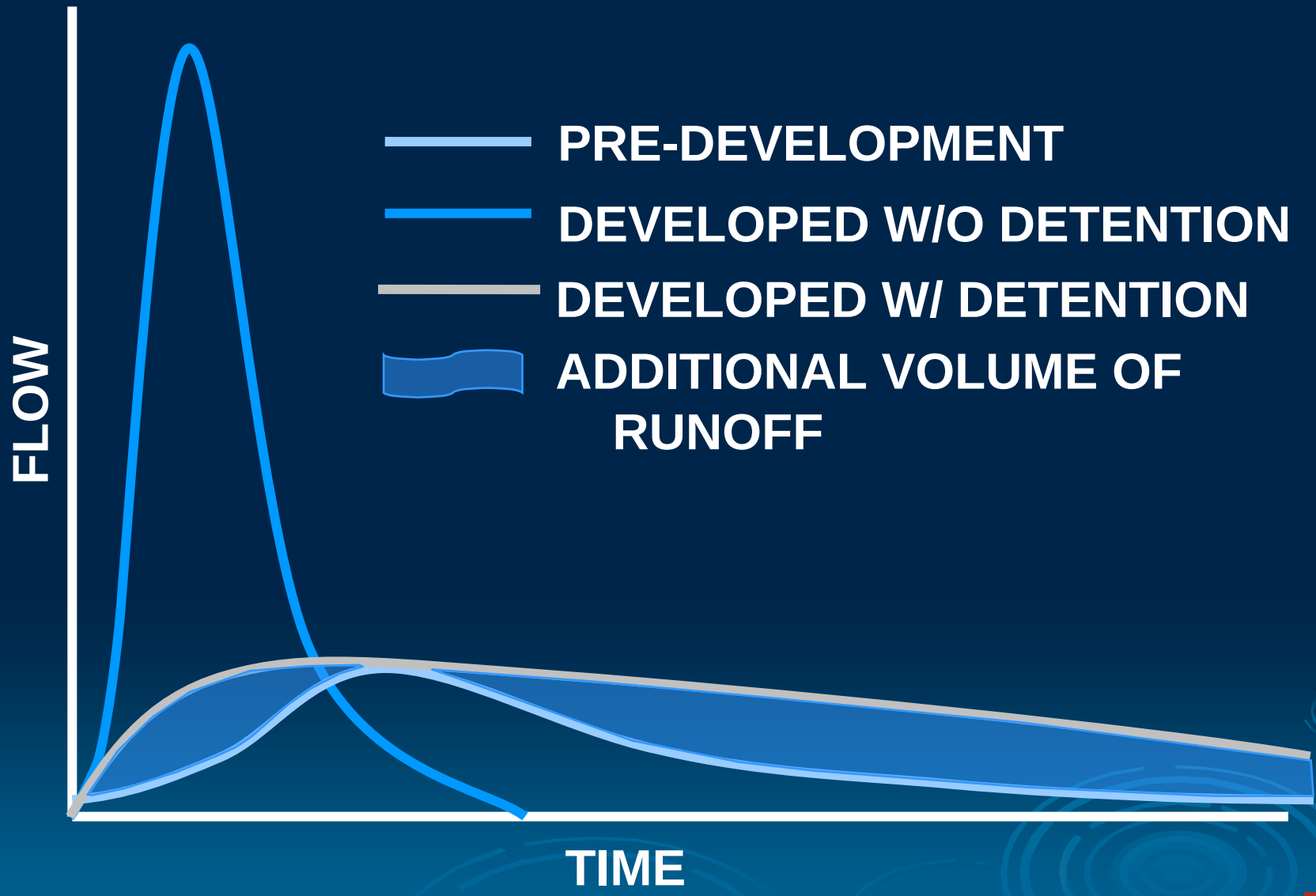
Collect and convey water away from the site just as quickly and efficiently as the law will allow through enclosed storm sewer systems designed with concentrated points of discharge that generate a velocity and volume of flow that is nearly impossible to mitigate.

Everywhere USA Today





RUNOFF RATES AND VOLUMES



Northeastern Illinois Planning Commission

We blame it on too much rain…

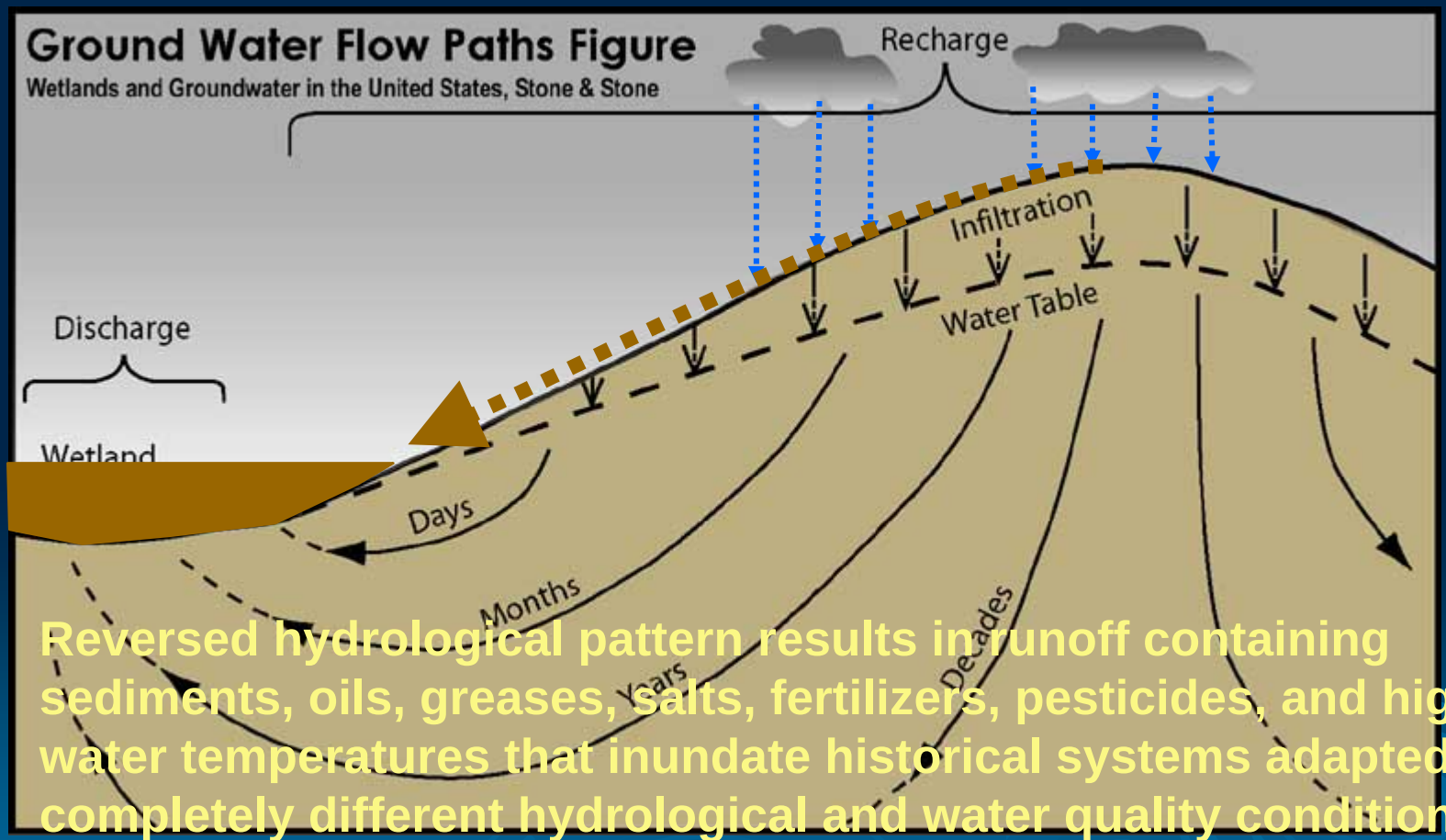
Severe Erosion of Stream and River Systems Caused by Excessive Runoff

Collapse of Infrastructure

Contemporary Hydrology

Upland becomes discharge zone

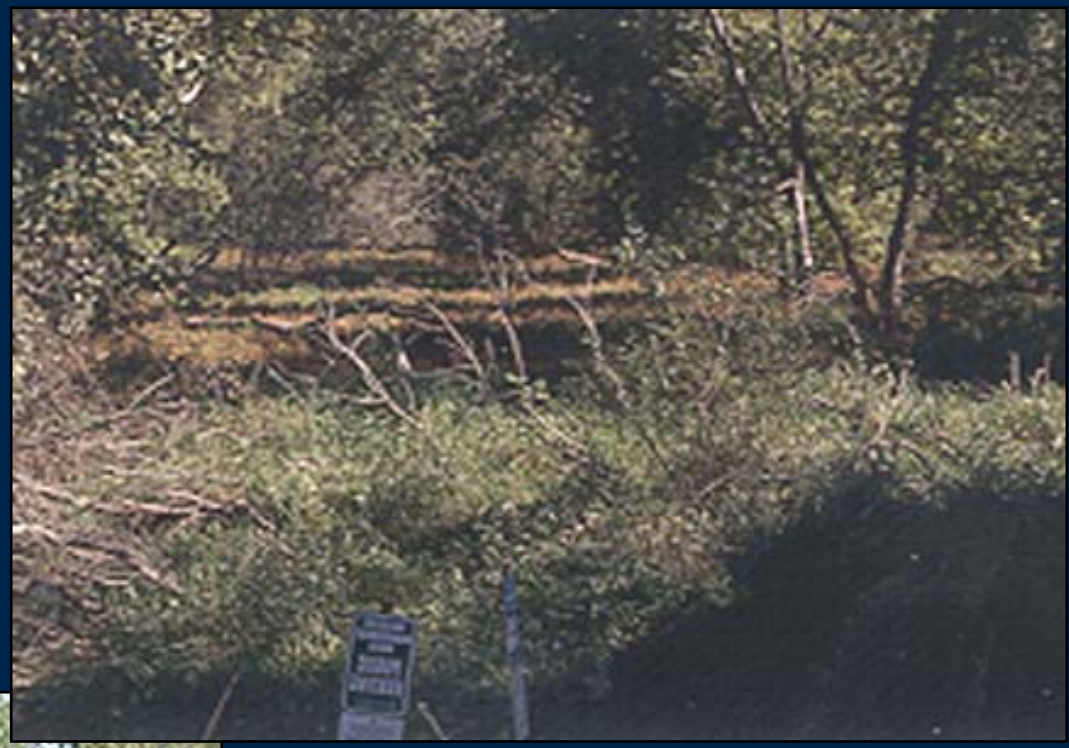
Natural wetlands are expected to function as recharge zones



Reversed hydrological pattern results in runoff containing sediments, oils, greases, salts, fertilizers, pesticides, and higher water temperatures that inundate historical systems adapted to completely different hydrological and water quality conditions

Floodwaters from Poplar Creek

Loss of system stability and bio-diversity in flood prone habitats



What are we trying to do better?

New Urbanism and LEED

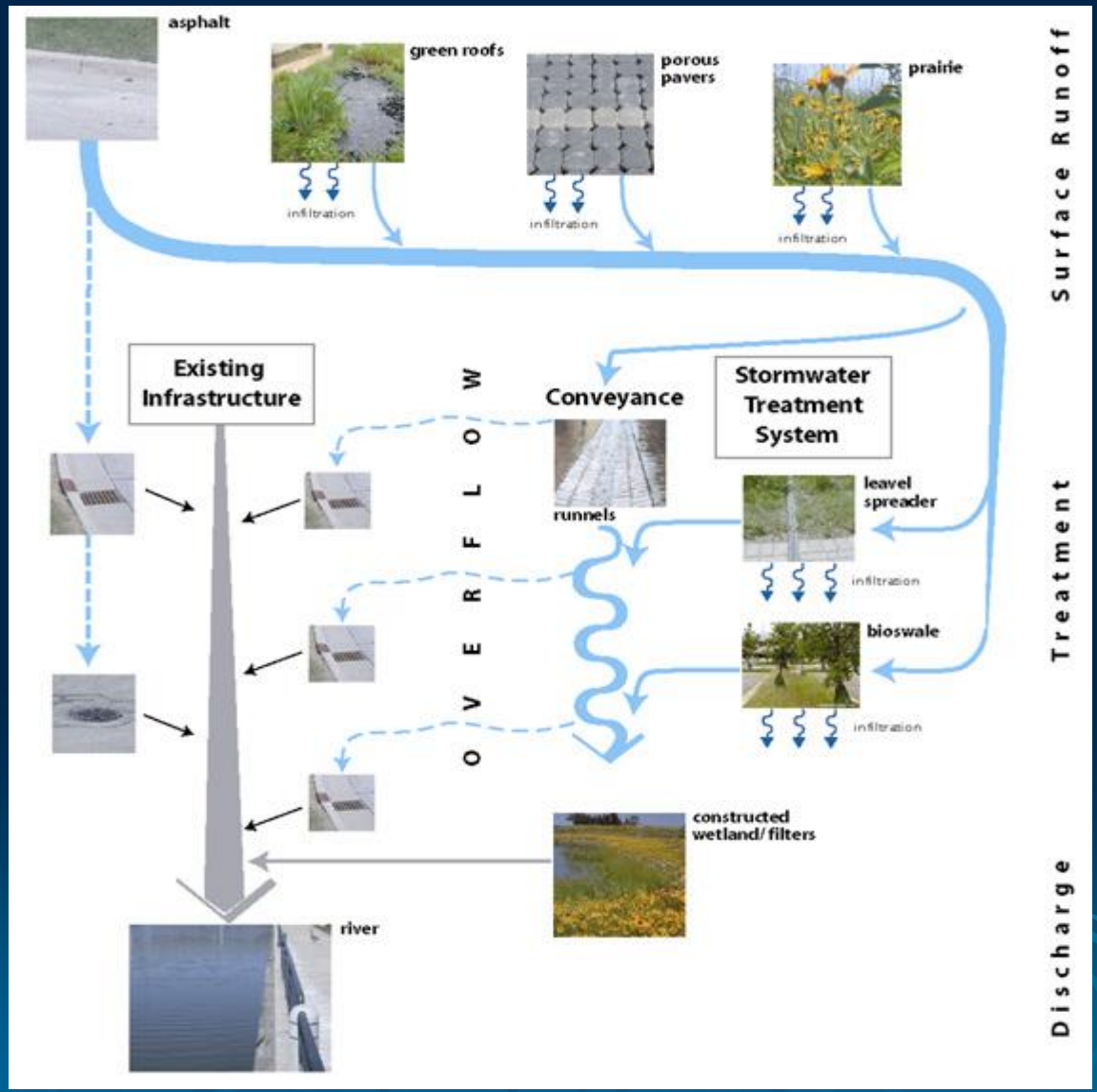
Promote Site and Watershed Scale Sustainable Land Use and Integrated Water Resource Management Practices

In Contrast to Conventional Stormwater Management Approaches based on Collection and Conveyance

Sustainable Water Resource Management Strategies are based on Decentralized Systems Design: Capture rainfall, diffuse flow, cleanse, and absorb on-site; Restore historically stable patterns of infiltration and groundwater dominated hydrology

Decentralized Systems Design

"Think Green"



Promote Green Infrastructure Practices

The "Golden Rule" of Sustainable Water Resource Management

"TREAT WATER AS A RESOURCE - NOT A WASTE PRODUCT"

GREEN INFRASTRUCTURE PRACTICES

- Restore Groundwater Dominated Hydrology
- Minimize Impervious Surfaces
- Avoid Concentrated Points of Discharge – Diffuse & Absorb
- Capture & Infiltrate Runoff Onsite - Uplands Most Effective
- Preserve Natural Drainage Features & Systems
- Avoid Soil Disruption & Restore Soil Health
- AVOID SOIL COMPACTION !!!
- Celebrate Water as a Precious Resource

Green Infrastructure Practices

- Native Landscape Systems

Tellabs Research and Development Facility
Bolingbrook, IL

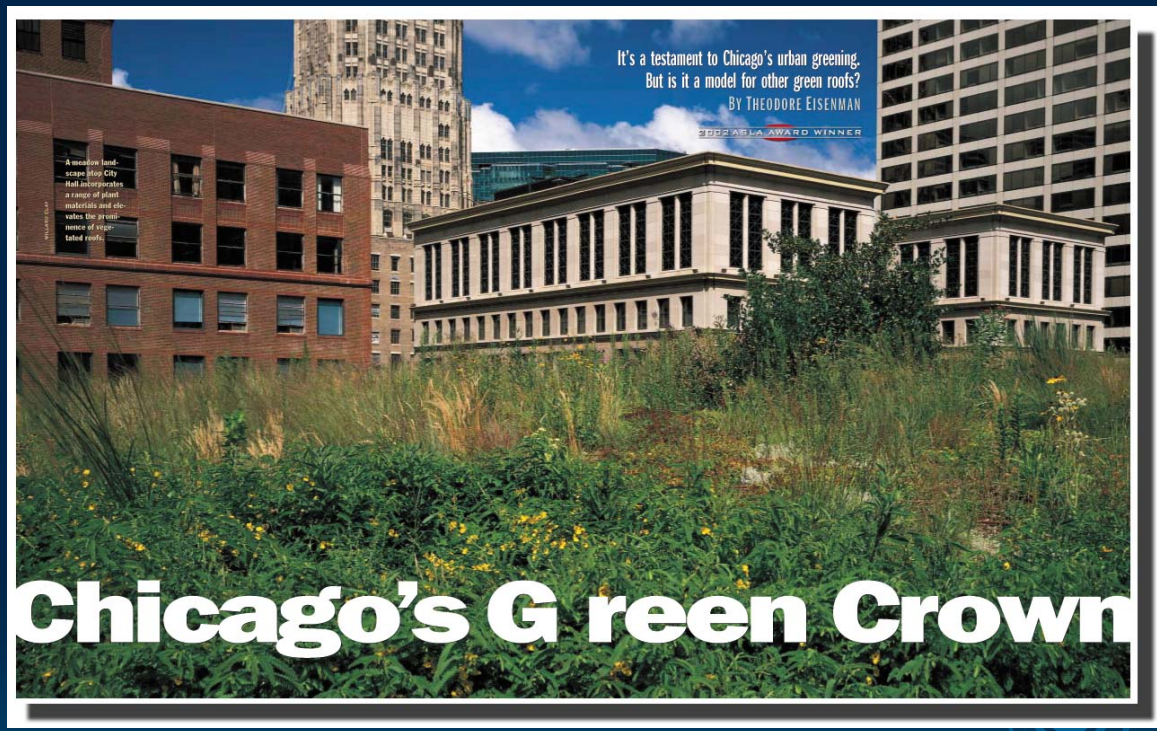
Green Infrastructure Practices

- Native Landscape Systems

Tellabs Research and Development Facility
Bolingbrook, IL

Green Infrastructure Practices

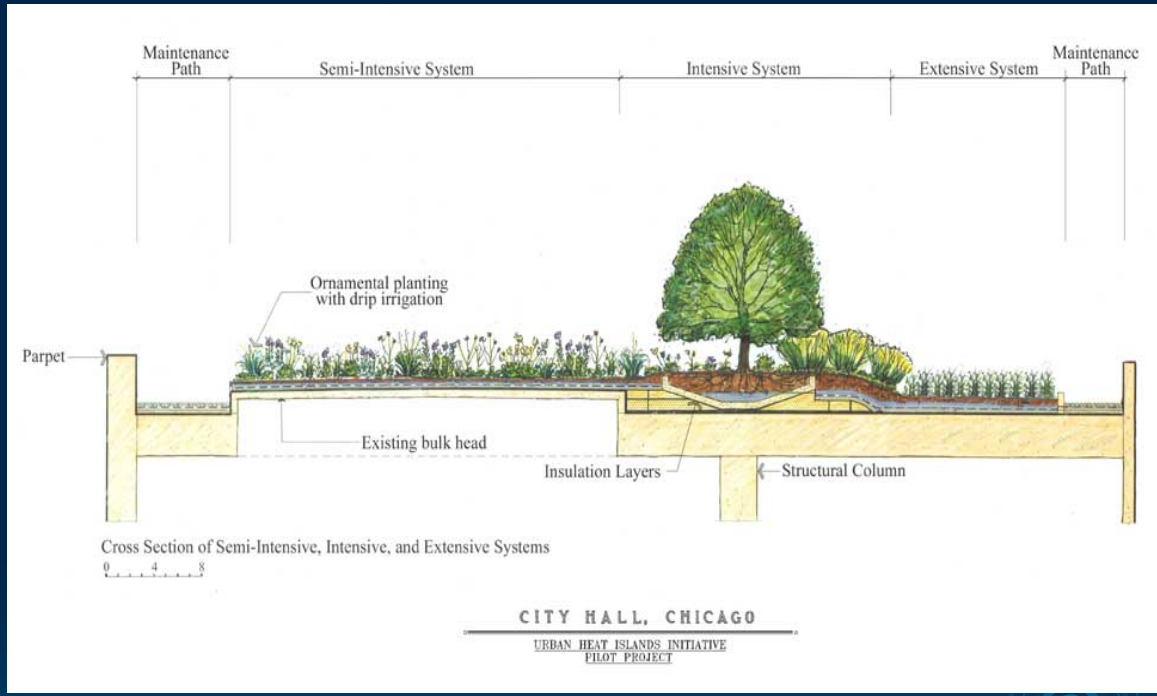
- Native Landscape Systems
- Green Roofs



Chicago City Hall Green Roof Demonstration Project

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs



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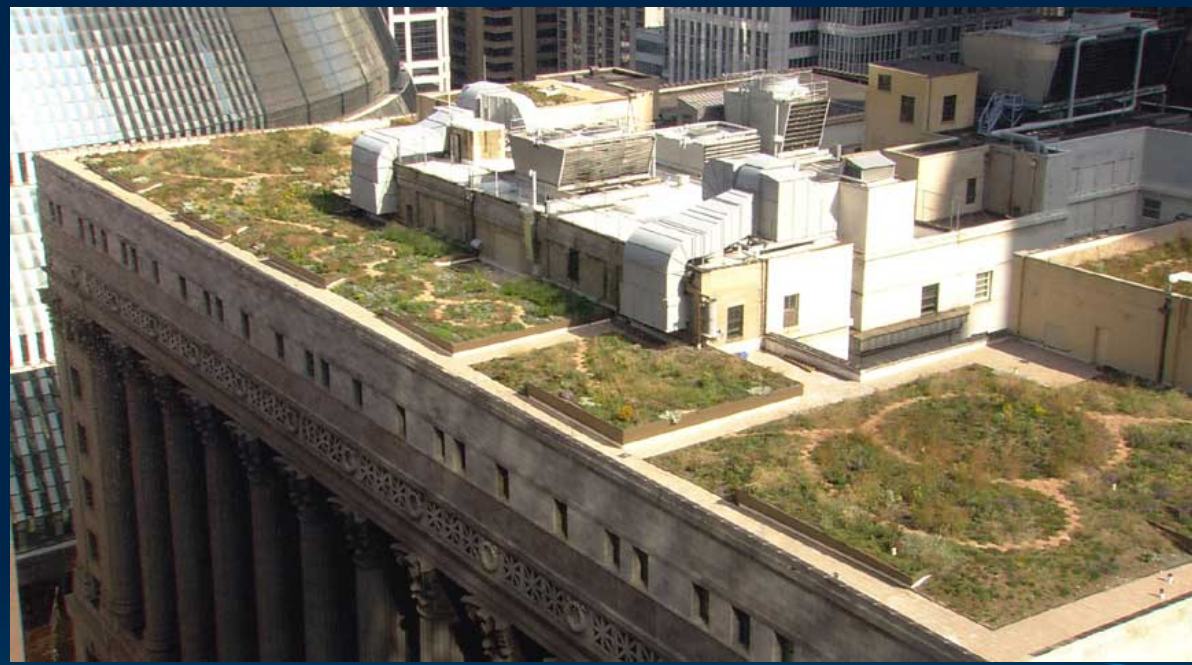


Chicago City Hall Green Roof Demonstration Project

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs

Chicago City Hall Green Roof Demonstration Project

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales

Tellabs Headquarters
Naperville, IL

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales

Tellabs Headquarters
Naperville, IL

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales
- Porous Paving

Morton Arboretum
Lisle, IL

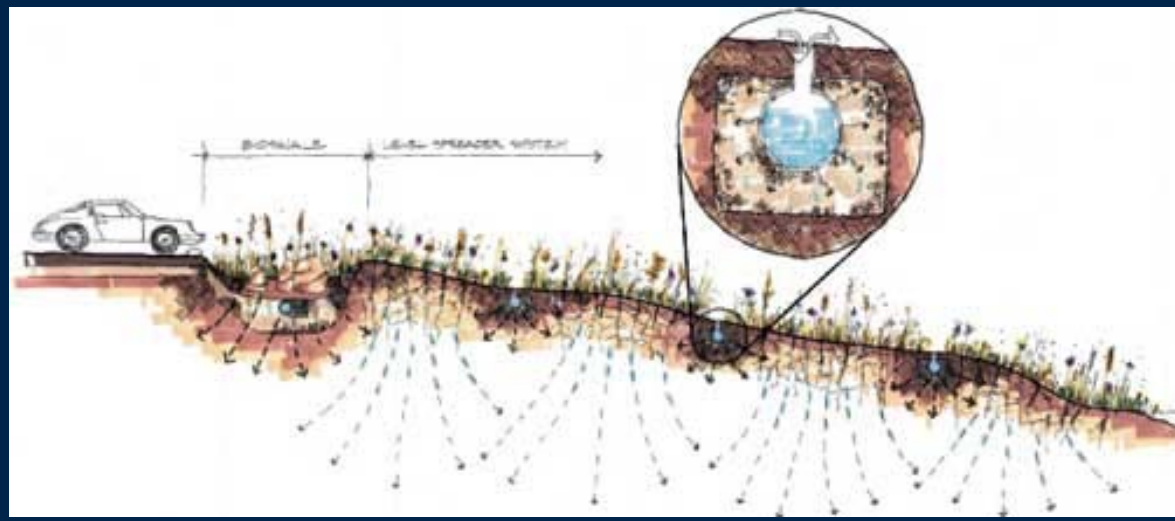
Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales
- Porous Paving

Morton Arboretum
Lisle, IL

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales
- Porous Paving
- Level Spreaders



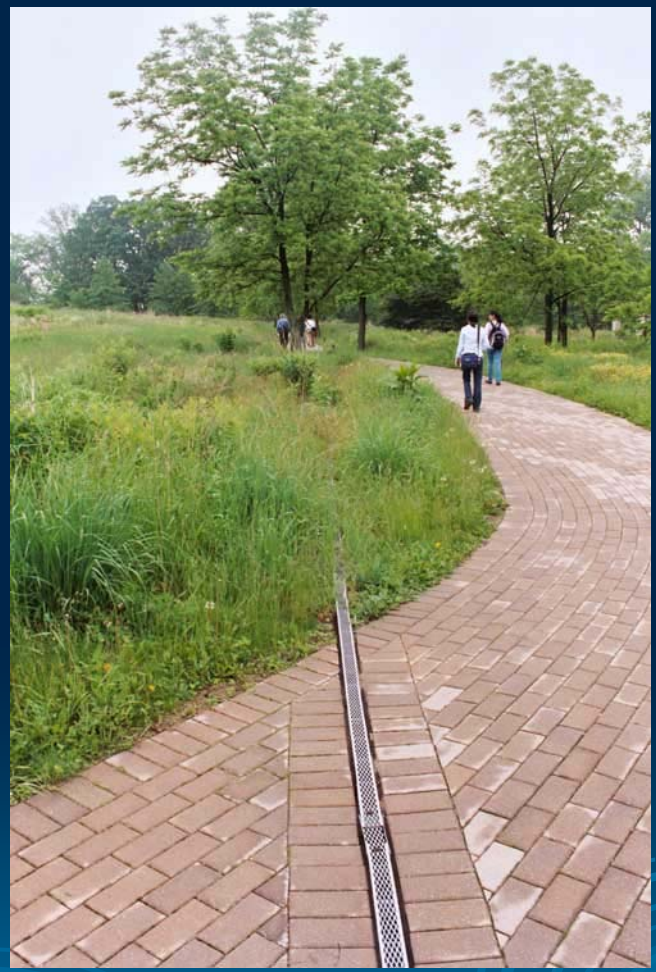
Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales
- Porous Paving
- Level Spreaders

Coffee Creek Center
Chesterton, IN

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales
- Porous Paving
- Level Spreaders



Coffee Creek Center
Chesterton, IN

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales
- Porous Paving
- Level Spreaders
- Rain Gardens

Rain Gardens of West Michigan
www.raingardens.org

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales
- Porous Paving
- Level Spreaders
- Rain Gardens

Community Rain Garden Program
City of Maplewood, MN

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
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Community Rain Garden Program
City of Maplewood, MN

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales
- Porous Paving
- Level Spreaders
- Rain Gardens
- Cisterns & Rain Barrels

Chicago Center for Green Technology

Green Infrastructure Practices

- Native Landscape Systems
- Green Roofs
- Bio-swales
- Porous Paving
- Level Spreaders
- Rain Gardens
- Cisterns & Rain Barrels

Green Infrastructure Practices

- Native Landscape Systems
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- Porous Paving
- Level Spreaders
- Rain Gardens
- Cisterns & Rain Barrels
- Naturalized Retention

Tellabs Research and Development Facility
Bolingbrook, IL

Green Infrastructure Practices

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- Naturalized Detention

Sears Prairie Stone
Hoffman Estates, IL

Green Infrastructure Practices

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Sears Prairie Stone
Hoffman Estates, IL

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Sears Prairie Stone
Hoffman Estates, IL

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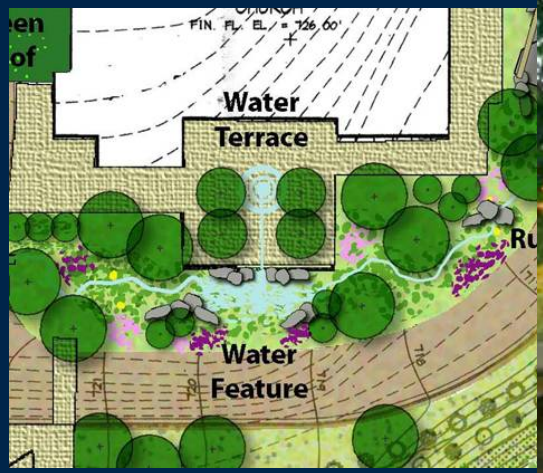
- Rain Gardens
- Cisterns & Rain Barrels
- Naturalized Detention

Matteson Village Hall & Green
Matteson, IL

What we know about integrating sustainable systems on brownfields

Integrated Site Planning and Green Infrastructure Solutions



Tellabs Corporate Headquarters

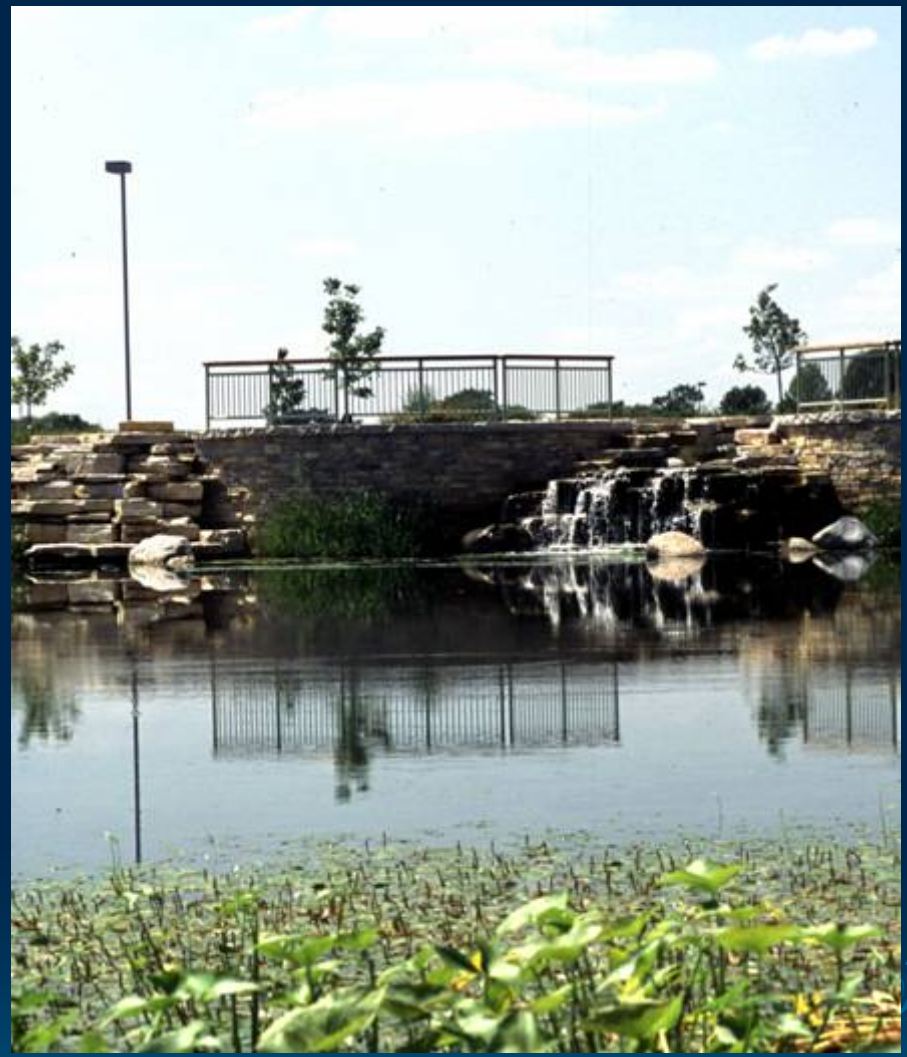
Naperville, IL

Before

After

Celebrate the Beauty and Function of Water as a Precious Resource

“Incorporate water as a visible design element”



Aurora Middle School

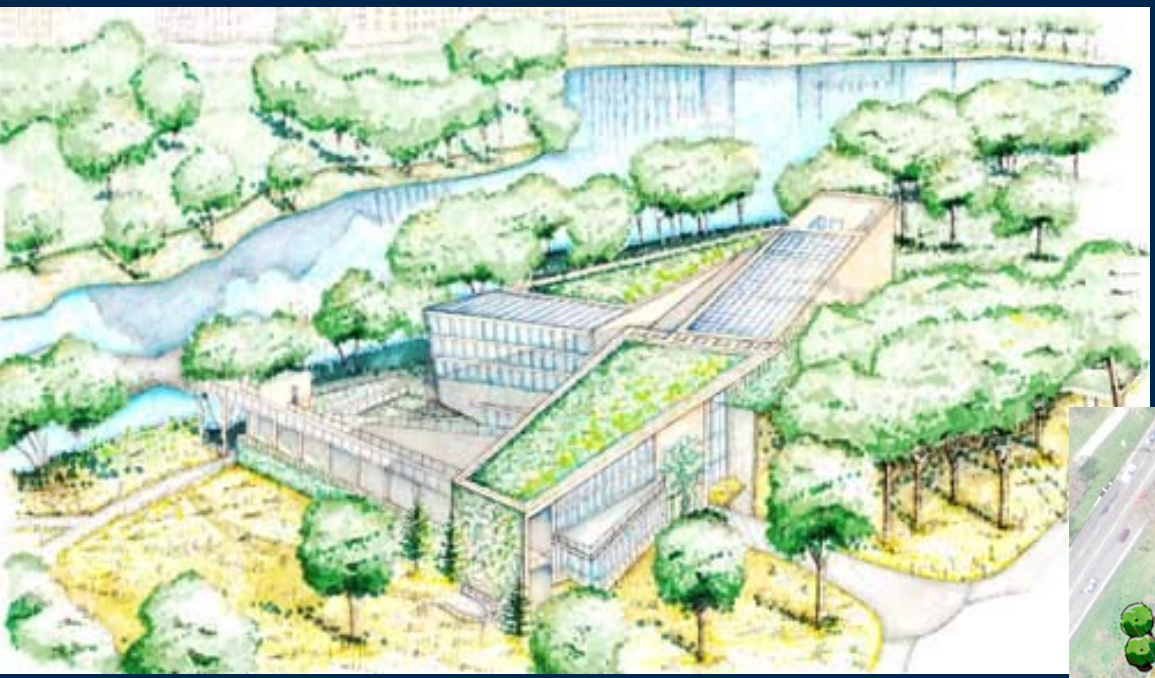

6
5

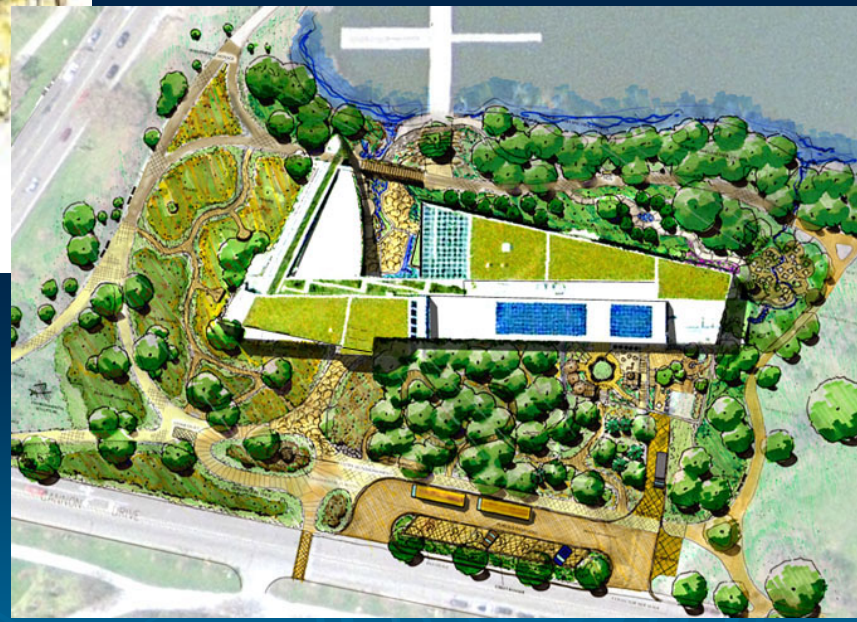

22
21

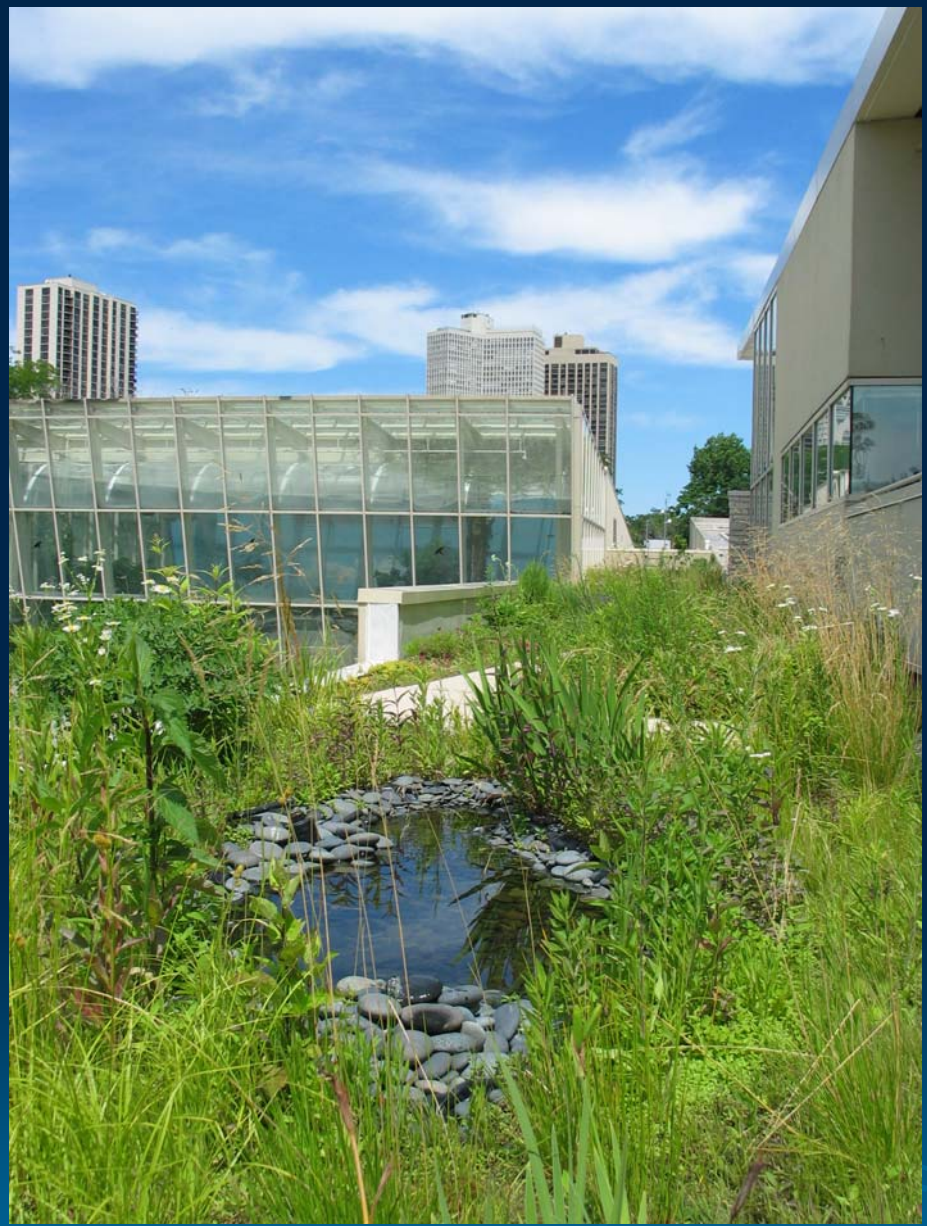

1550

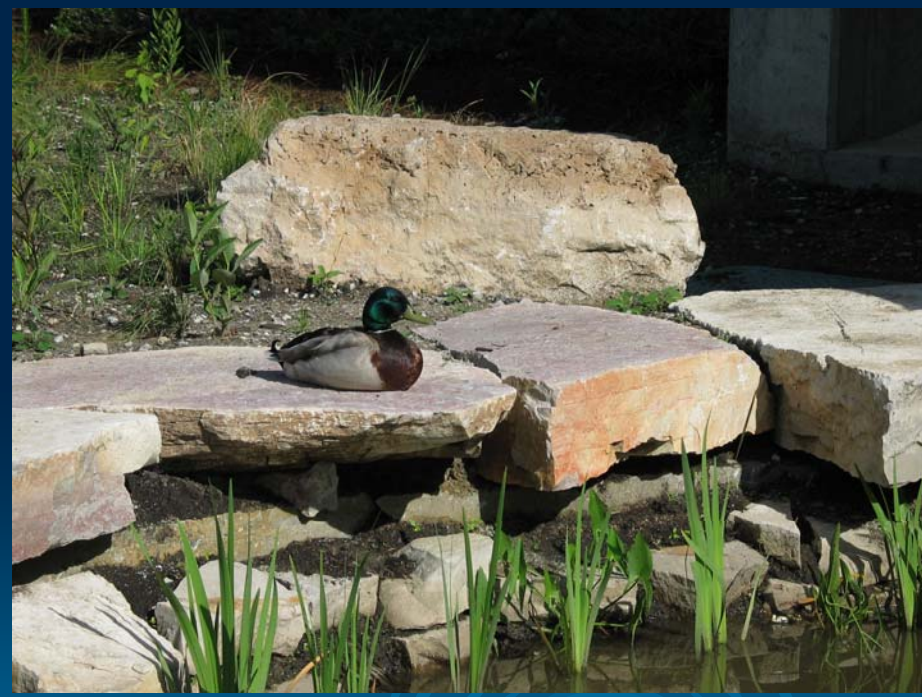

STAFF
PARKING

Peggy Notebeart Nature Museum
Chicago Illinois





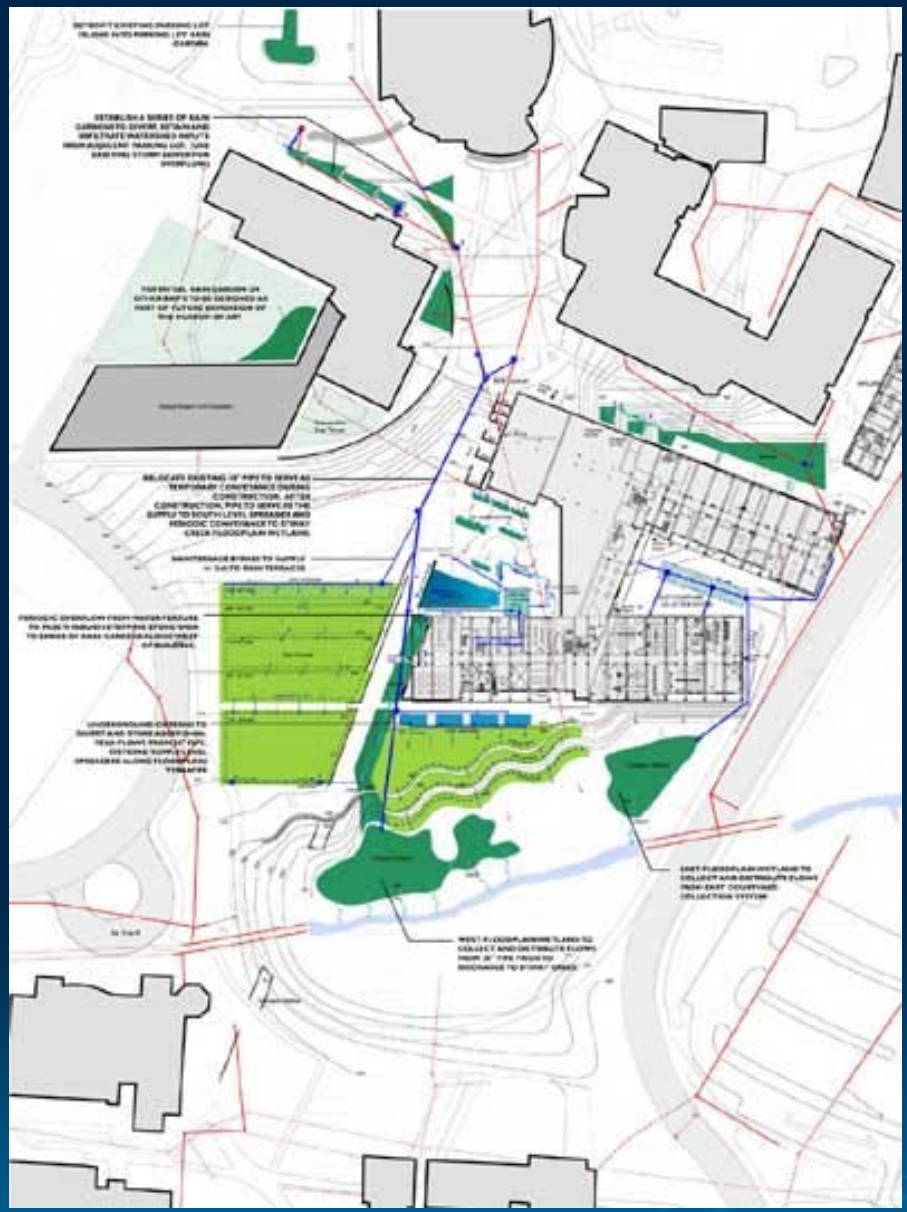


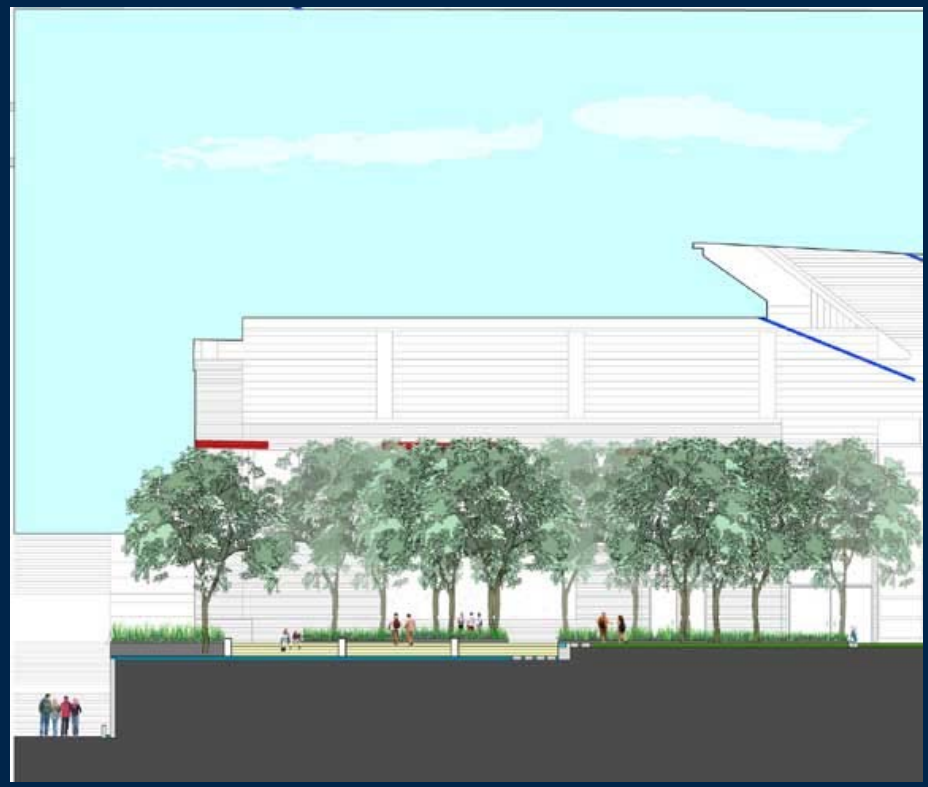


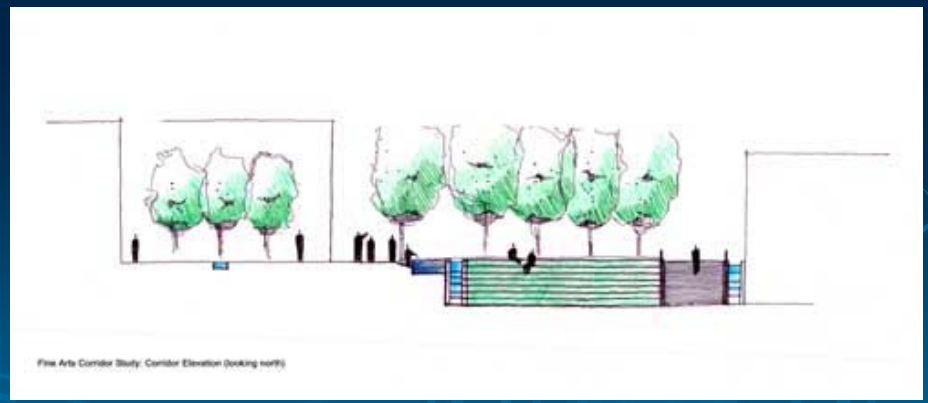
Spaces for People

Kresge Foundation Headquarters
Troy, Michigan

University of Georgia
Lamar Dodd School of Art

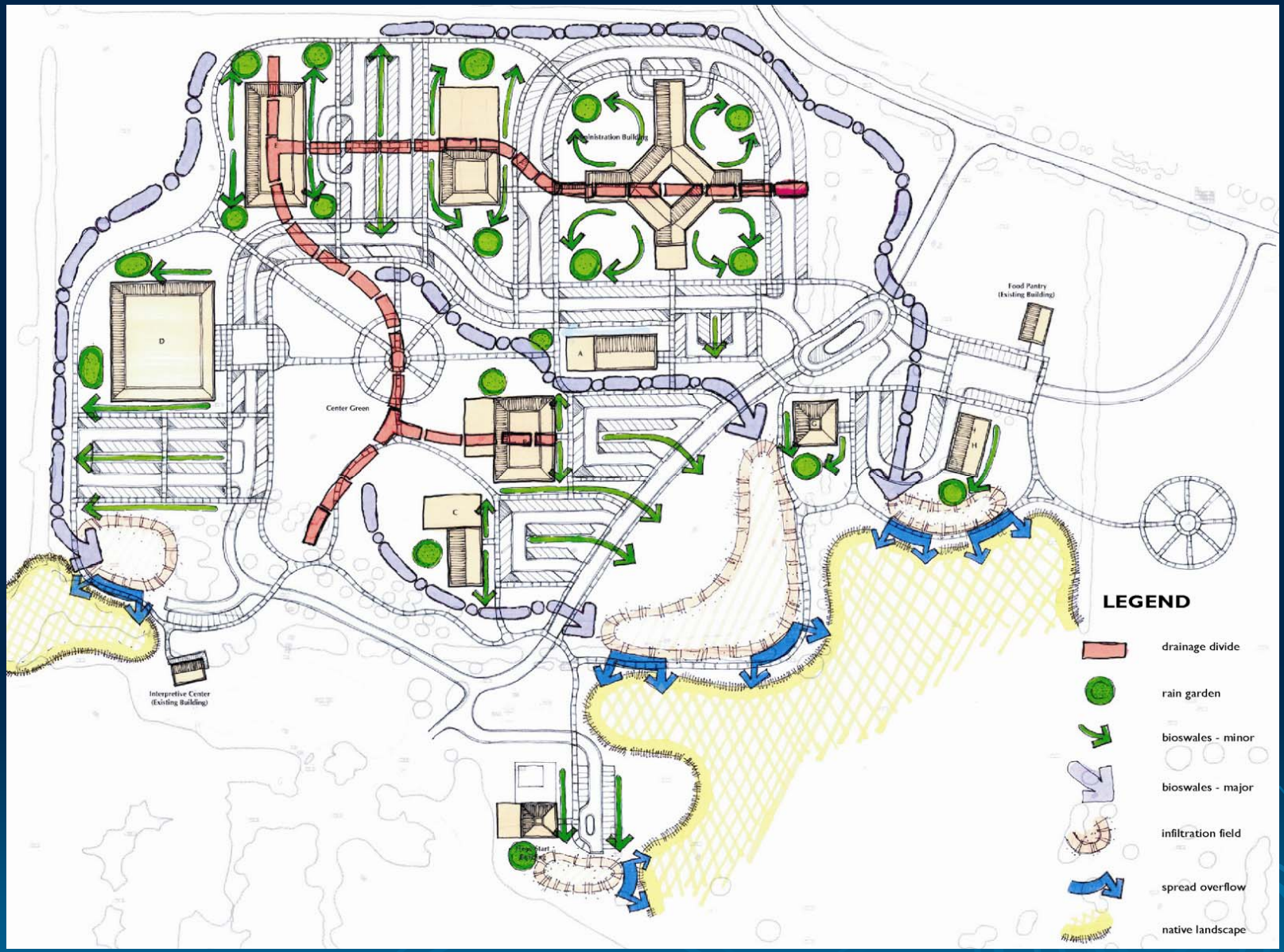




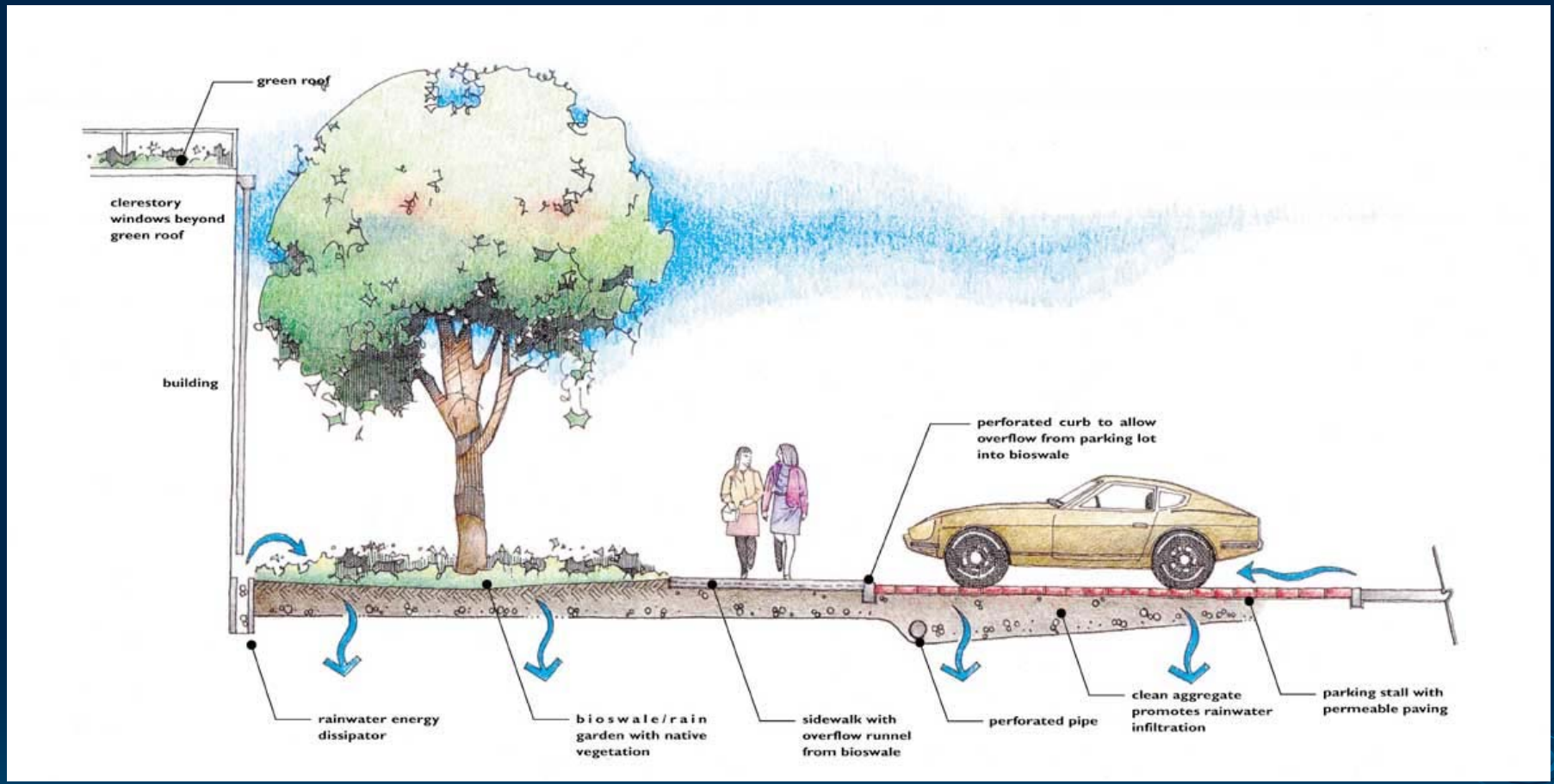


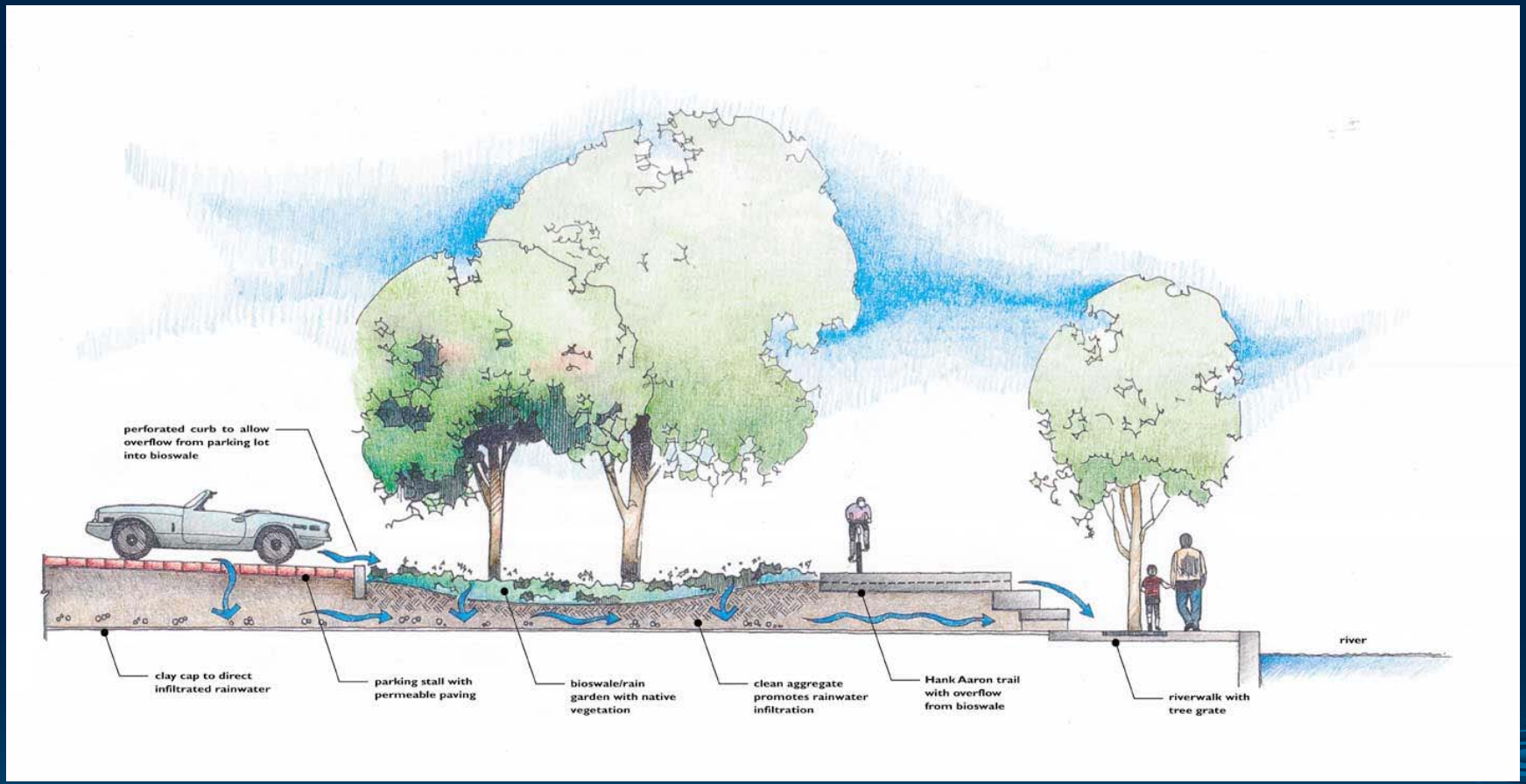
Fine Arts Corridor Study: Corridor Elevation (looking north)

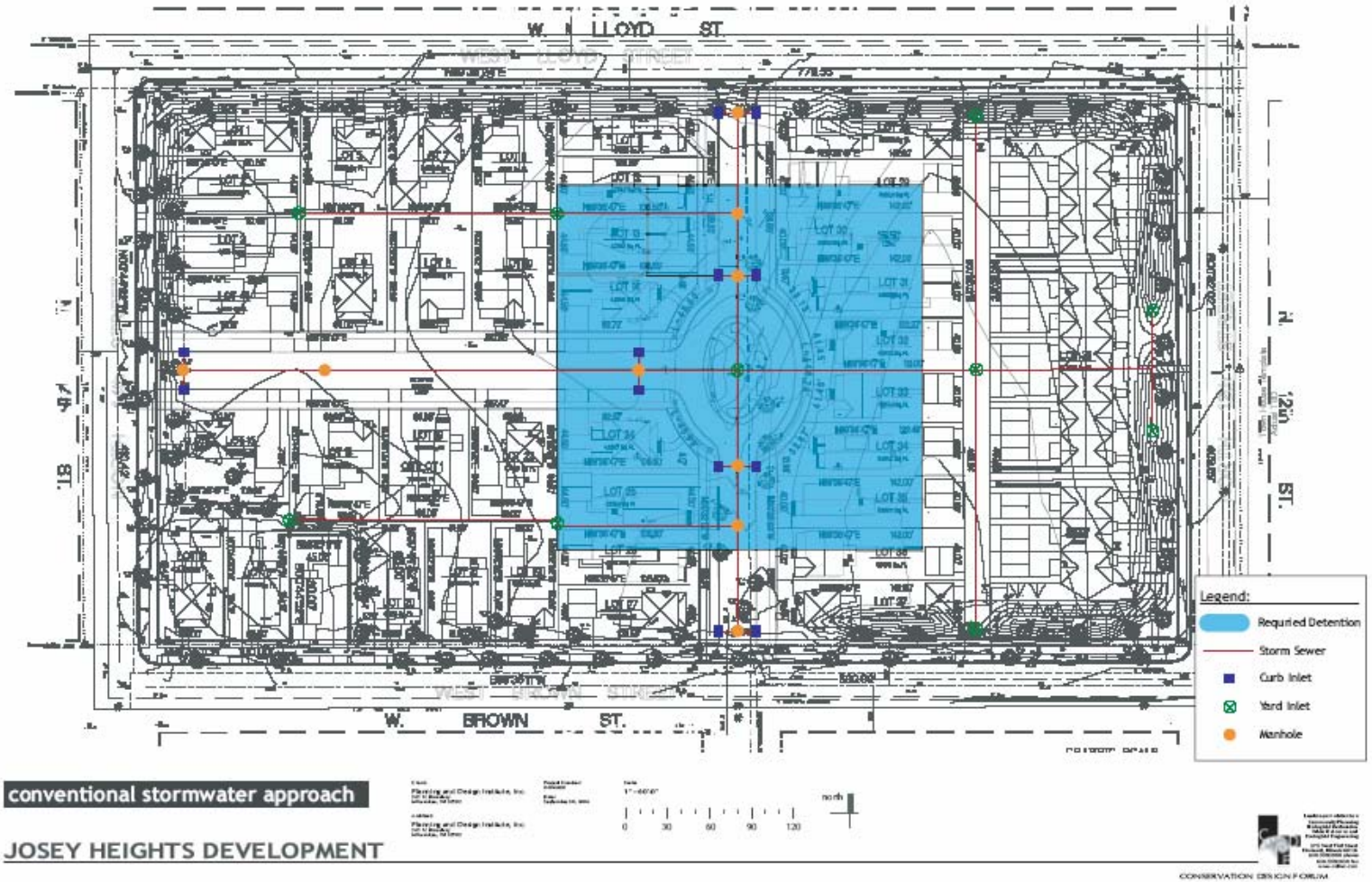
Pokagon Tribal Complex


Administration Building
Food Pantry
(Existing Building)
D
A
Center Green
C
H
Interpretive Center
(Existing Building)
LEGEND
drainage divide
rain garden
bioswales - minor
bioswales - major
infiltration field
spread overflow
native landscape

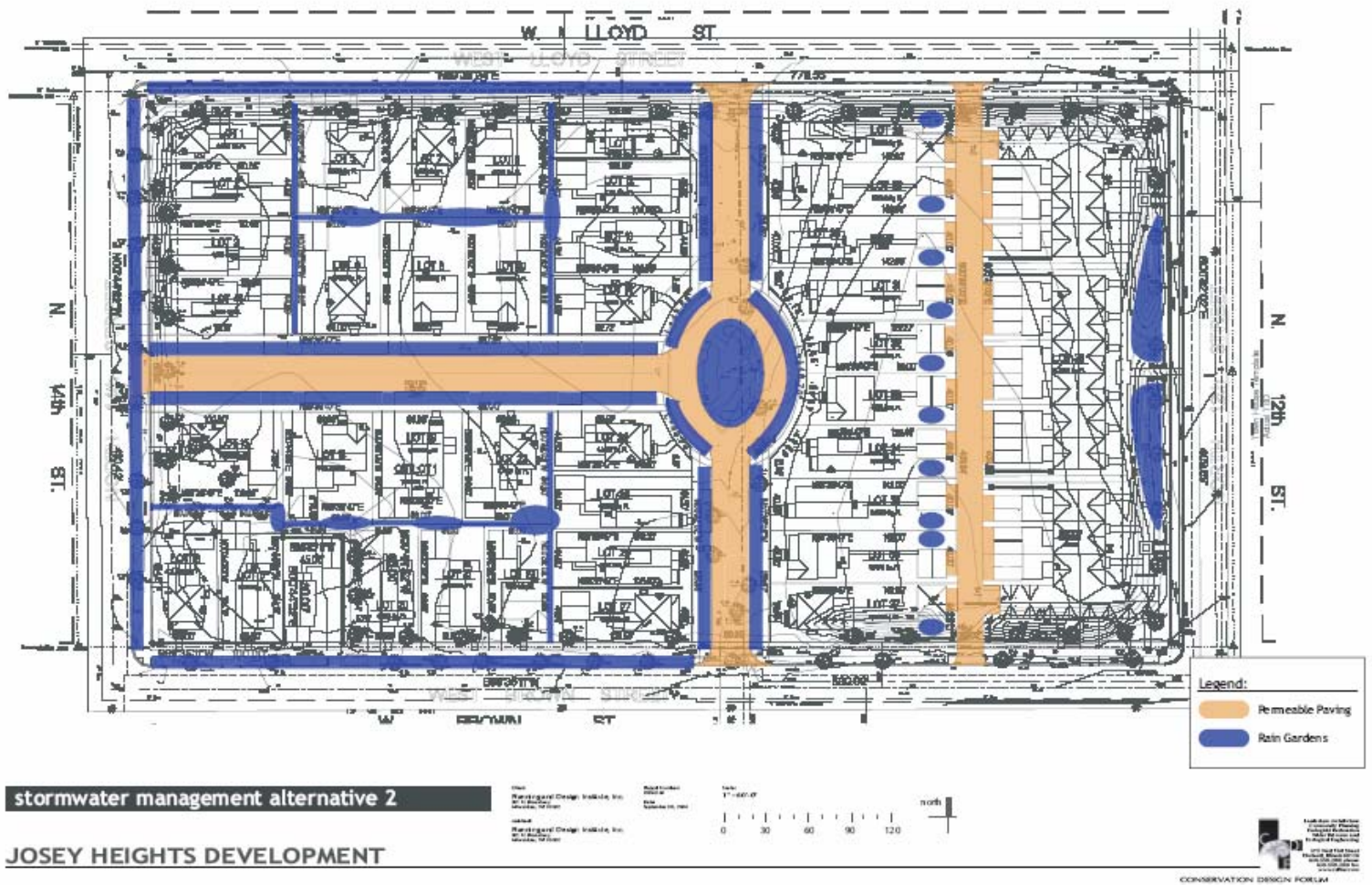
Menomonee Valley
Sustainable Development Guidelines


green roof
clerestory windows beyond green roof
building
perforated curb to allow overflow from parking lot into bioswale
rainwater energy dissipator
bioswale/rain garden with native vegetation
sidewalk with overflow runnel from bioswale
perforated pipe
clean aggregate promotes rainwater infiltration
parking stall with permeable paving

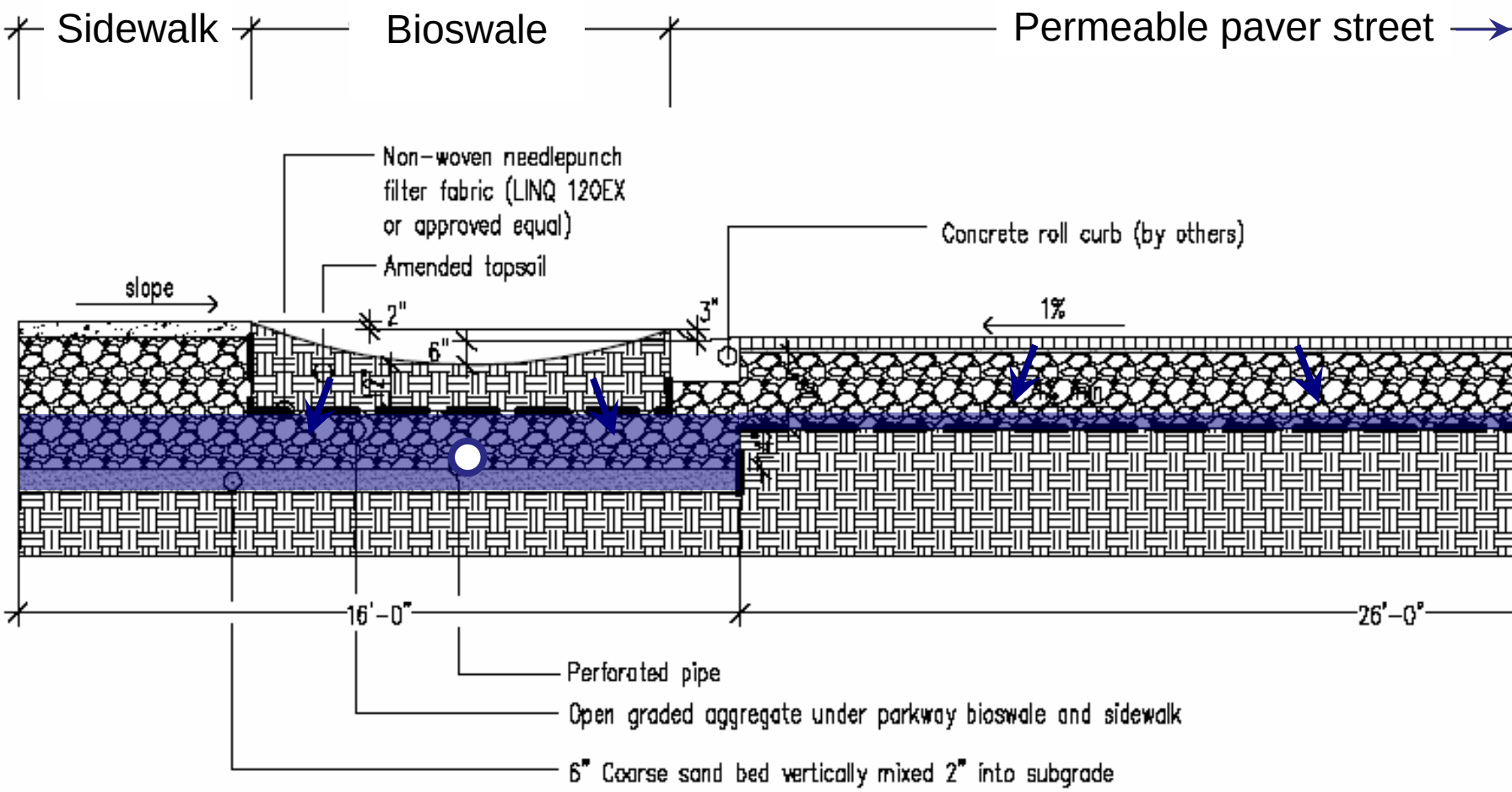

perforated curb to allow overflow from parking lot into bioswale
clay cap to direct infiltrated rainwater
parking stall with permeable paving
bioswale/rain garden with native vegetation
clean aggregate promotes rainwater infiltration
Hank Aaron trail with overflow from bioswale
riverwalk with tree grate
river



Josey Heights, Milwaukee, WI

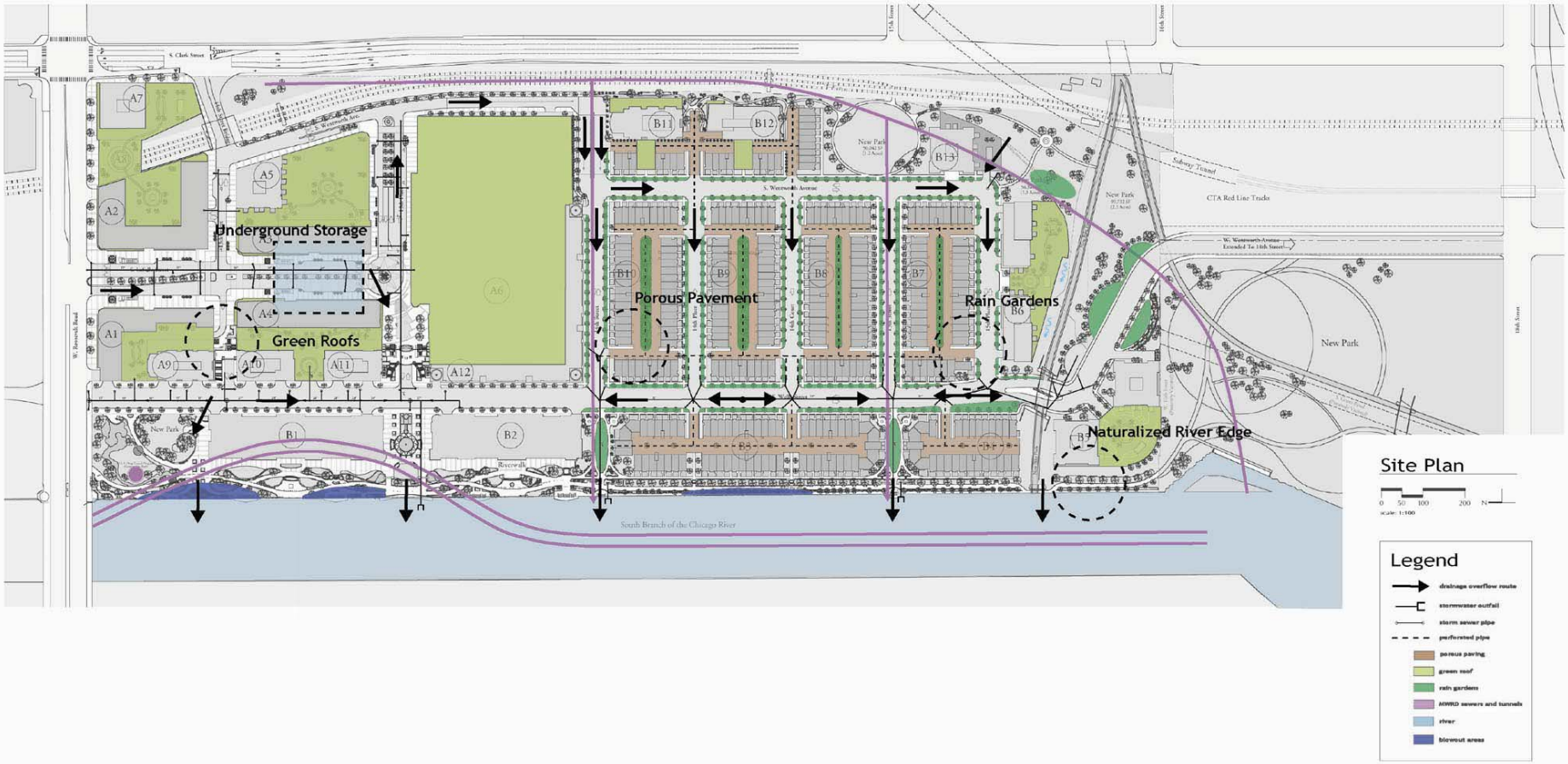


Assuming 0.1 inch/hour infiltration rate of existing soils
Achieves 0.65 inches over site = 36% Infiltration of 2-Yr, 24-Hr



3 RIGHT OF WAY CROSS SECTION

NOT TO SCALE



site plan

RIVERSIDE PARK

Conceptual Stormwater Solutions October 2003

CONSERVATION DESIGN FORUM

Riverside Park, Chicago, IL

Rain Garden Benefits:
- Pollutant filtration and adsorption
- Storm water quantity reduction
- Aesthetically pleasing

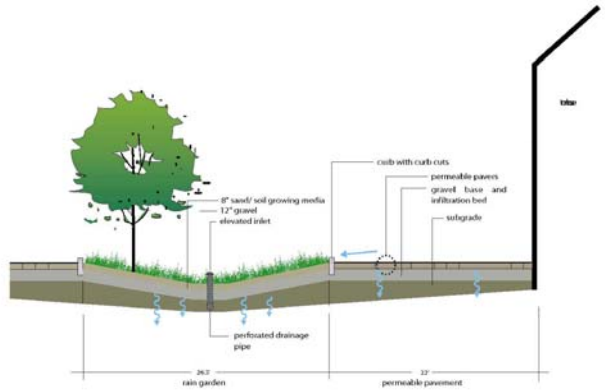
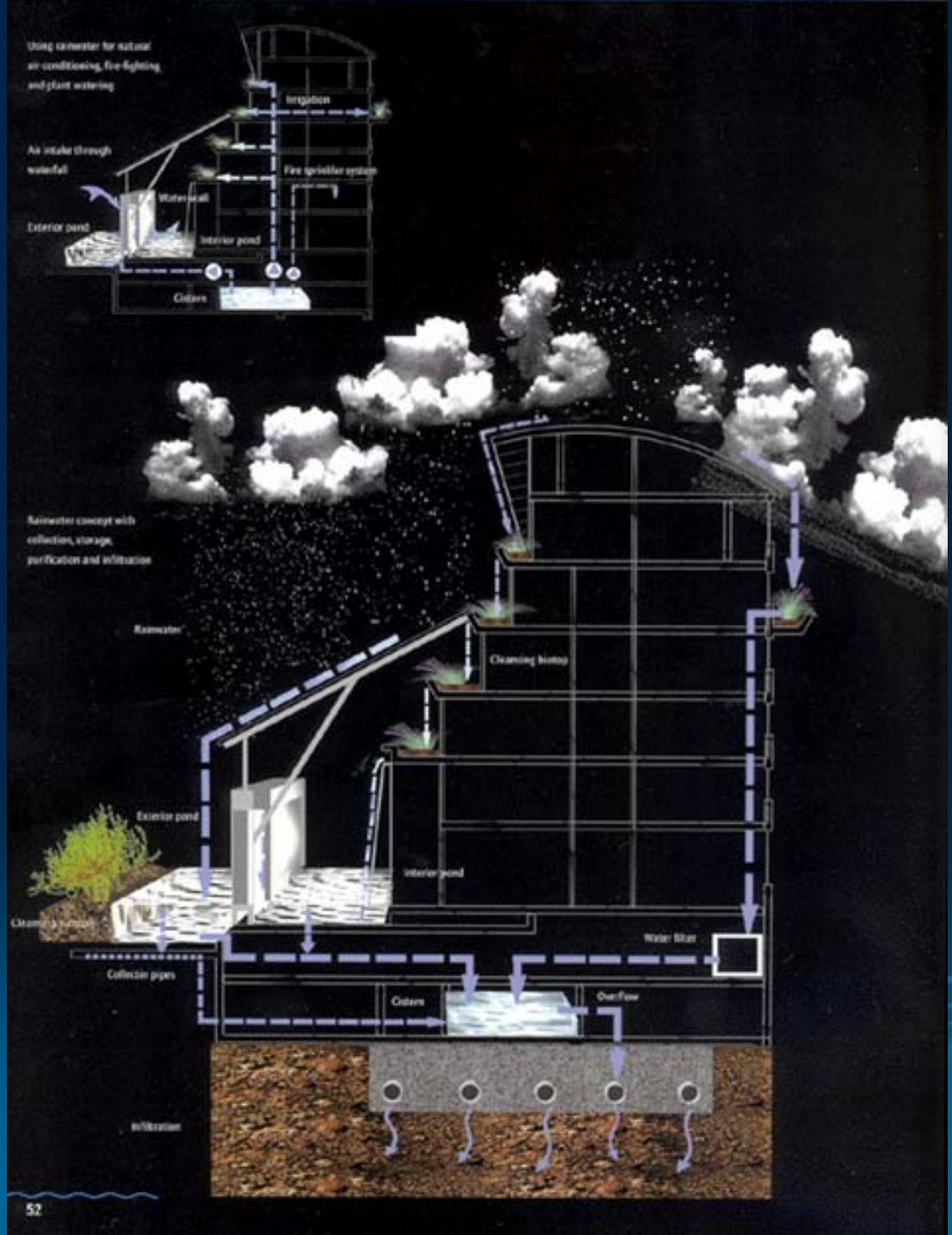


Figure 3: motor court permeable paving and rain garden section

RIVERSIDE PARK
Conceptual Stormwater Solutions

Nuremberg Prisma
Atelier Dreiseitl


Using rainwater for natural air-conditioning, fire-fighting and plant watering
Irrigation
Air intake through waterfall
Fire sprinkler system
Waterfall
Exterior pond
Interior pond
Cistern
Rainwater concept with collection, storage, purification and infiltration
Rainwater
Cleaning device
Exterior pond
Interior pond
Water filter
Collector pipes
Cistern
Overflow
Infiltration


ATELIER DREISEITL
D - 88662 ÜBERLINGEN


ATELIER DREISEITL
D - 88662 ÜBERLINGEN

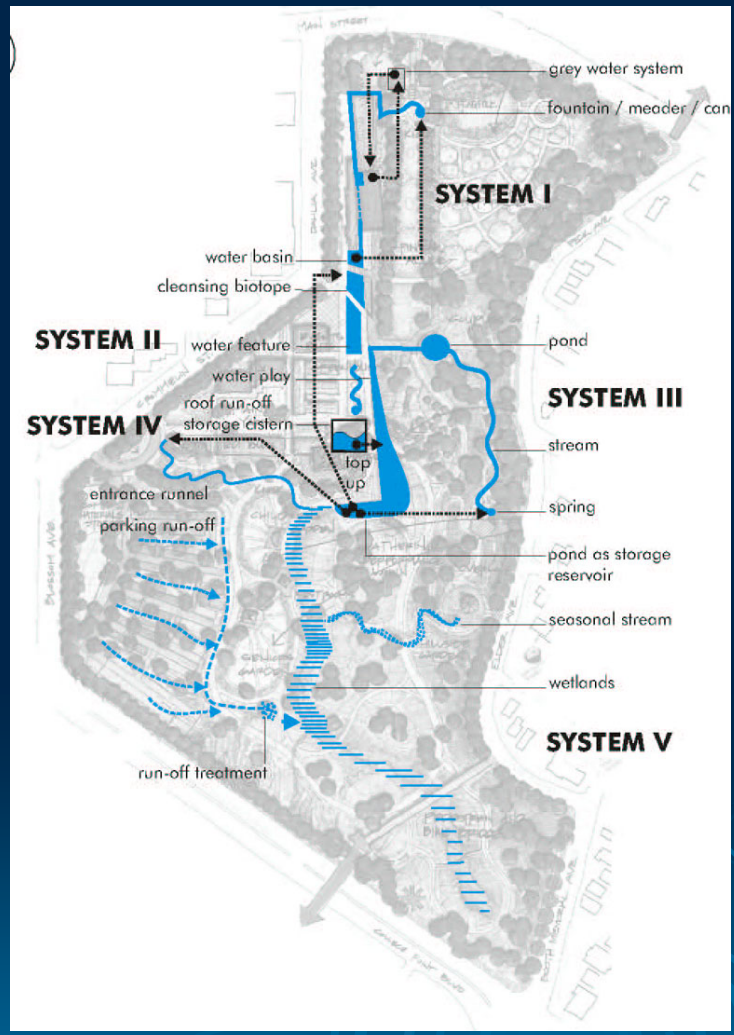

ATELIER DREISEITL
D - 88662 ÜBERLINGEN


ATELIER DREIBEIN
D - 88662 ÜBERLINGEN


ATELIER DREISEITL
D - 88662 ÜBERLINGEN


ATELIER DREISEITL
D - 88662 ÜBERLINGEN

Queens Botanical Garden



Rain Water Collection and Reuse

Queens Botanical Garden
Flushing, New York

Villa Park Green Police Station

Villa Park Engineering Department
Villa Park, Illinois

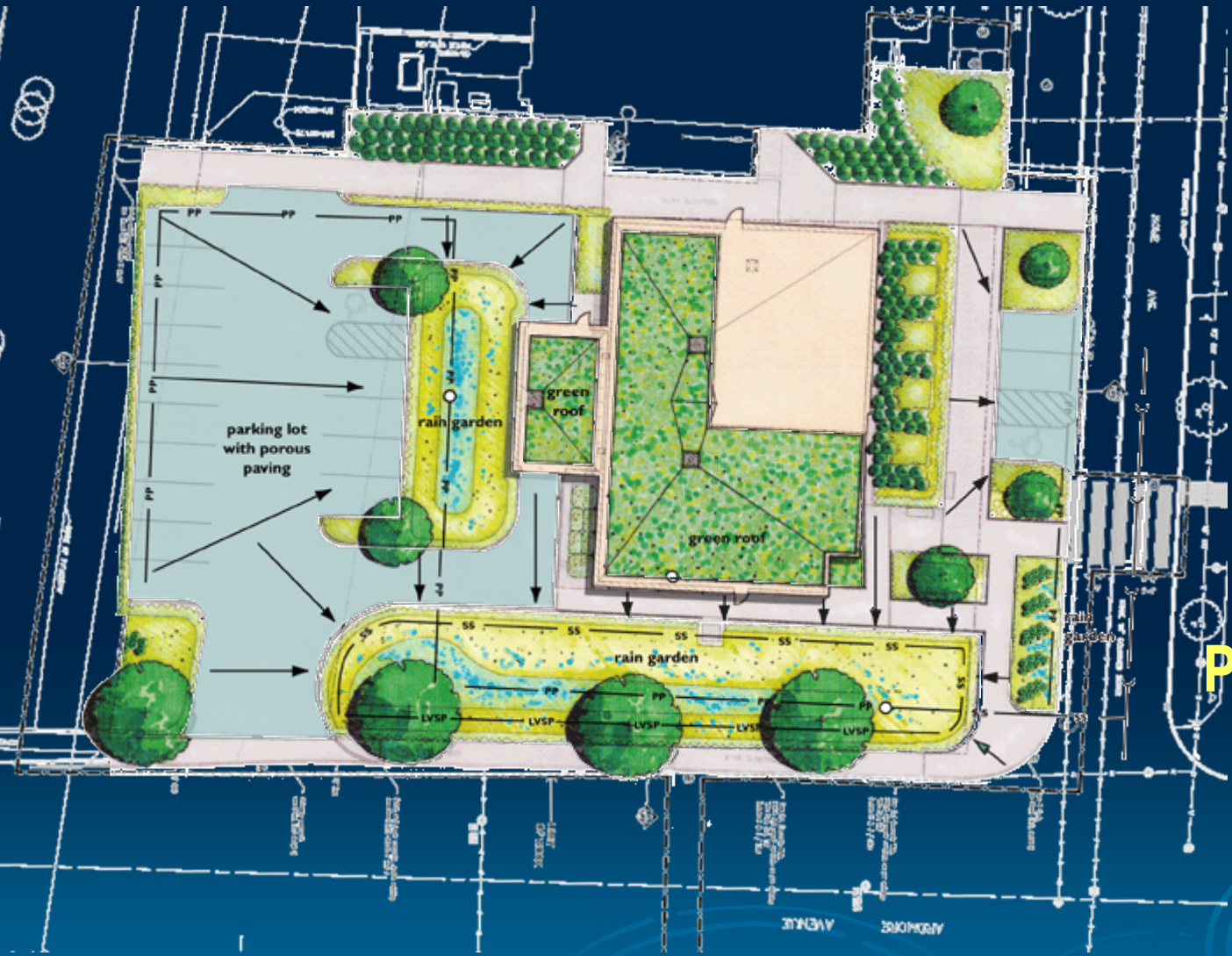
Conservation Design Forum, Inc.
Elmhurst, Illinois
www.cdfinc.com

This project was funded, in part, by U.S. Environmental Protection agency funds under Section 319 of the Clean Water Act distributed and administrated through the Illinois Environmental Protection Agency

Field Tested Permeability Rate for Site: 0.3 in/hr

Allowable release rate: 0.1 cfs/acre

Site: 0.72 acres

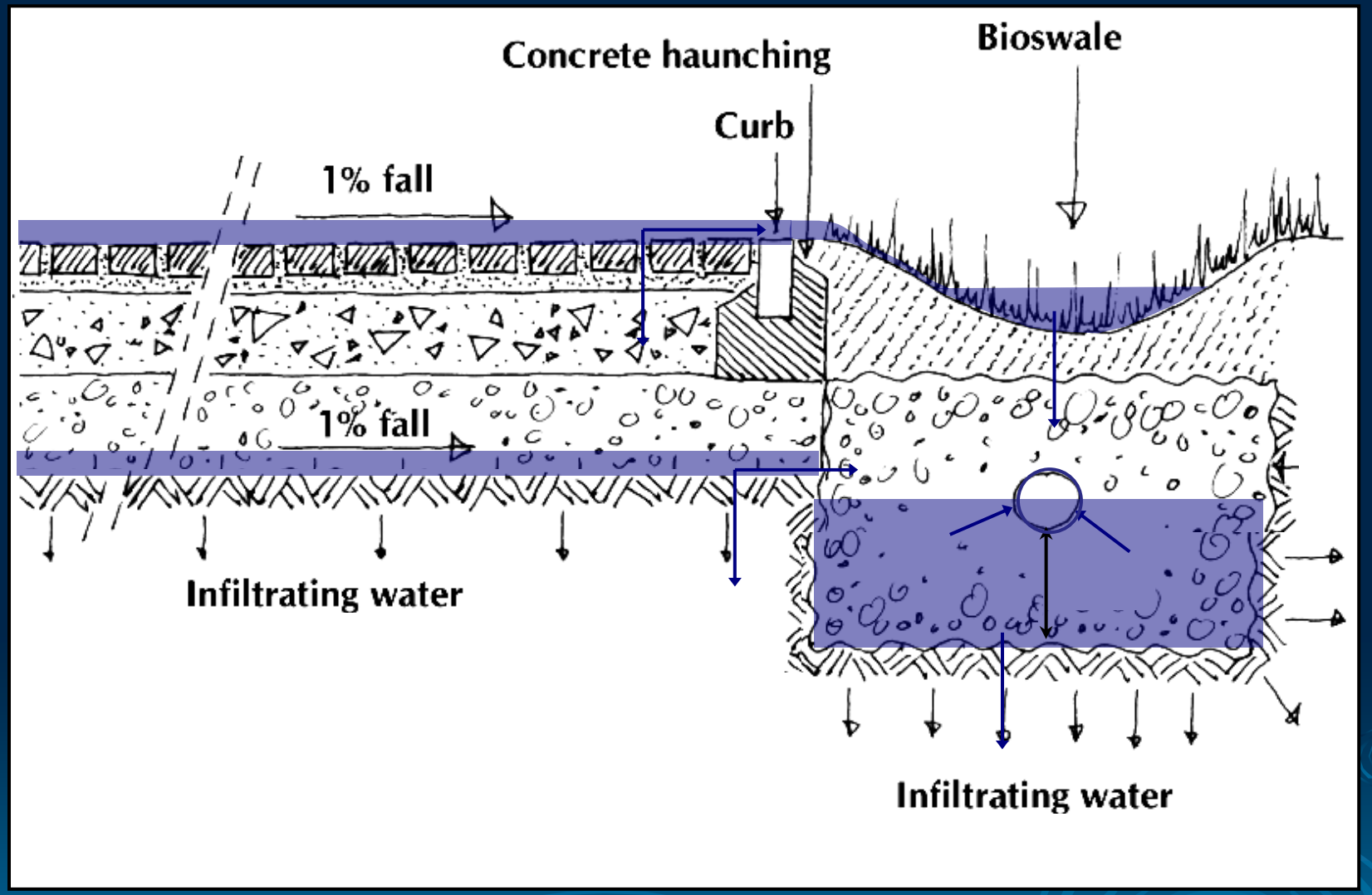


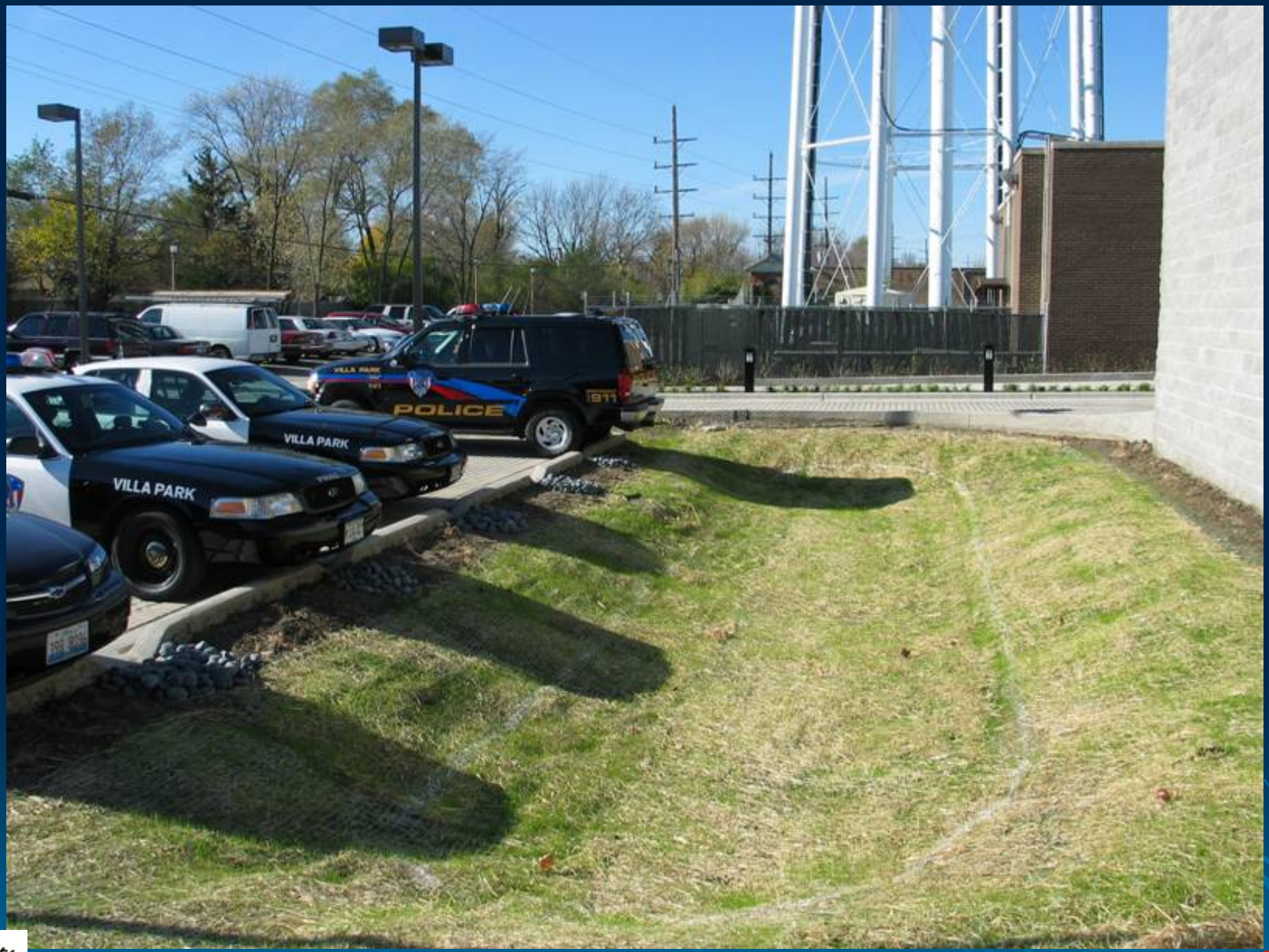
Green Roofs

Porous Pavement

Rain Gardens

Porous Pavement and Bio-swales/ Rain Gardens




POLICE
VILLA PARK
VILLA PARK


SPEED
LIMIT
25


BUDRON


POLICE
POLICE

	24-hour rainfall	Existing Conditions 24-hour runoff & 15 min. flow	Proposed Conditions
1-yr discharge	-	0.9 cfs	0.003 cfs
2-yr discharge	-	1.2 cfs	0.012 cfs
100-yr discharge	-	4.4 cfs	0.071 cfs
1-yr runoff	2.51 in	1.97 in	0.02 in
2-yr runoff	3.04 in	2.49 in	0.14 in
100-yr runoff	7.58 in	6.98 in	2.50 in

What we know about integrating sustainable systems on brownfields

What we don’t know about integrating sustainable systems on brownfields or anywhere; and why it’s important

3% OF THE WATER ON EARTH IS FRESHWATER

AND ONLY 1% IS AVAILABLE FOR HUMAN CONSUMPTION

Thank you!

Questions?

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